UNITED STATES ARMY

AVIATION DIGEST

MARCH 1985

FLYING NAVY STYLE

MARCH 1985 • VOLUME 31 • NUMBER 3

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Honorable John O. Marsh Jr.
Secretary of the Army

Major General Ellis D. Parker
Commander, U.S. Army Aviation Center

Brigadier General Wayne C. Knudson
Army Aviation Officer, ODCSOPS

Brigadier General Rudolph Ostovich III
Assistant Commandant
U.S. Army Aviation Center

Richard K. Tierney
Editor

The mission of the *U.S. Army Aviation Digest* (USPS 415-350) is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, Aviation medicine and other related data.

The *Digest* is an official Department of the Army periodical published monthly under the supervision of the commander, U.S. Army Aviation Center. Views expressed herein are not necessarily those of the Department of the Army nor the U.S. Army Aviation Center. Photos are U.S. Army unless otherwise specified. Use of the masculine pronoun is intended to include both genders unless otherwise stated. Material may be reprinted provided credit is given to the *Aviation Digest* and to the author unless otherwise indicated.

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This publication has been approved by the Secretary of the Army, 6 January 1984, in accordance with Army Regulation 310-1. Second-class postage paid at Daleville, AL, and additional mailing offices.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-2. Complete DA Form 12-5-R and send directly to CDR, AG Publications Center, 2800 Eastern Boulevard, Baltimore, MD 21220. For any change in distribution requirements, initiate revised DA Form 12-5-R.

National Guard and Army Reserve units under pinpoint distribution also should submit DA Form 12-5-R. Other National Guard units should submit requests through their state adjutant general.

Those not eligible for official distribution or who desire personal copies of the *Digest* can order the magazine from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

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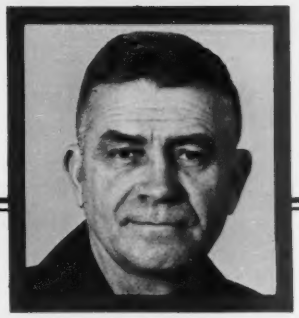
Major General Ellis D. Parker
Chief, Army Aviation Branch



Flight Simulation

YOU MAY NOT have heard the term "pilot maker" very often, but most people associated with Aviation know about a "Link Trainer." It was Ed Link, an organ maker, who in 1929 opened the development of flight simulation when he began experimenting with a device he called "the pilot maker."

Actually, Mr. Link's work with flight simulation was destined to save untold millions of dollars in flight training programs around the world. The U. S. Army recognized the potential savings early on, and in 1934 the Army Air Corps purchased its first "Link Trainer" which was used for instrument training. The philosophy was then, as it is today, to provide a cost effective training medium, capable of training complex tasks in an environment that is conducive to learning and safety.

During the next 33 years Army flight simulation progressed very little while the Army's aircraft fleet became increasingly more complex. By the early 1970s a large void had grown between flight simulator technology and the Army's simulator capabilities.

In 1967 the wheels of progress began to turn when the Department of the Army approved a qualitative materiel requirement to develop a synthetic flight training system (SFTS). The SFTS was conceived as an economy measure to replace operational aircraft in the training and sustaining of basic flight skills. The SFTS would ultimately include five high fidelity simulation devices to provide training for the entire fleet of operational aircraft— UH-1 Huey through the advanced attack helicopter. A plan was approved to develop and test the prototype devices at Ft. Rucker, AL.

The first prototype was a UH-1 instrument procedure trainer delivered to Ft. Rucker in December of 1970. Extensive testing revealed that the UH-1 flight simulator was indeed a viable alternative to training instrument flight procedures in the actual aircraft and convinced Army decisionmakers to continue the development of the SFTS.

The next prototype to be developed was the CH-47 Flight Simulator. This device was the first rotary wing simulator equipped with an external visual system allowing pilots to perform visual contact maneuvers in a simulator. By 1976, technological capabilities included superimposing a computer generated visual display onto the camera model generated display. This capability was included in the AH-1 Flight and Weapons Simulator to display and score weapons engagements. In 1979, two UH-60 prototype simulators underwent a comparative test between the older terrain board visual and the new computer generated visual. The final prototype device to be tested will be the AH-64 Combat Mission Simulator, scheduled to be tested in 1985. Some of the features to be evaluated on the prototype device include full battlefield simulation while flying a scenario against an active enemy threat.

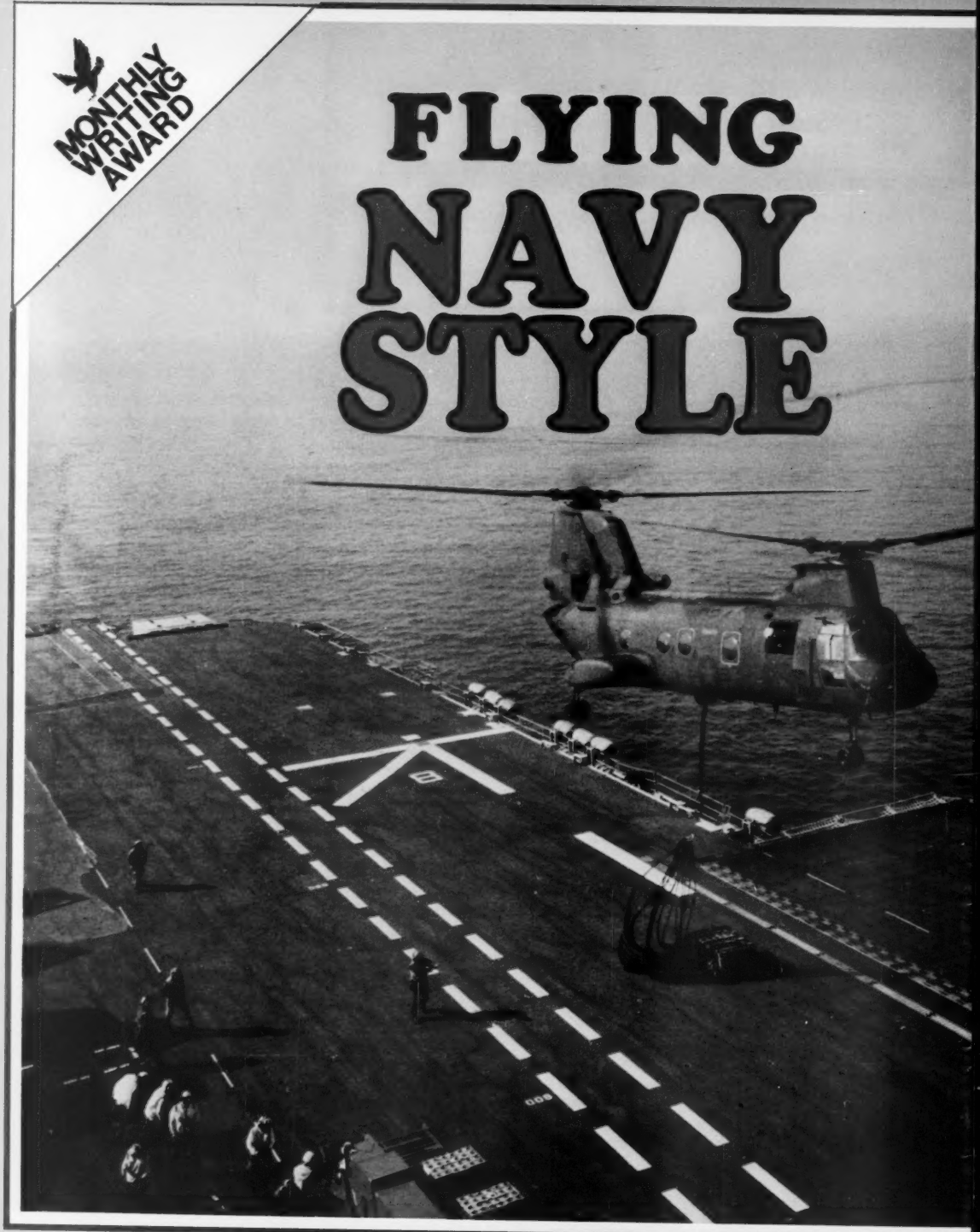
The results of the flight simulator tests are impressive. The Army's flight simulators have been successful in doing the job they were designed to do. Based upon the results of the tests, fielding plans for the aforementioned simulators have been approved. To date, three CH-47 and four AH-1 devices have been fielded with many more to follow.

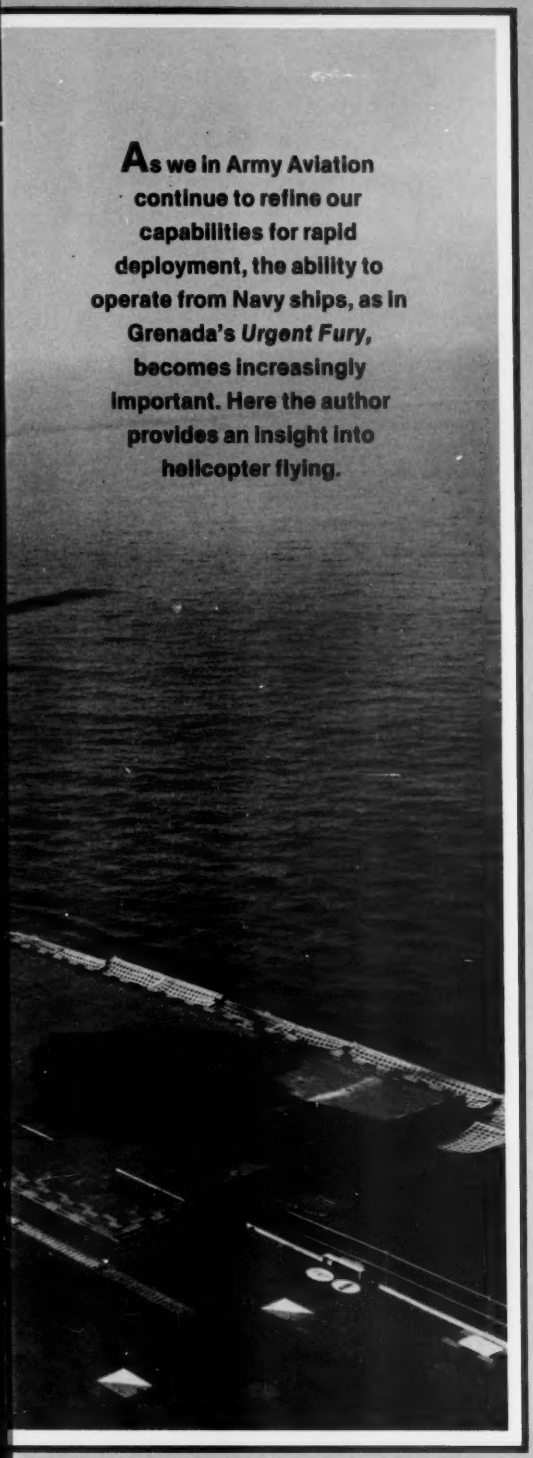
The future of flight simulation is bright with many exciting developments on the horizon. The Aviation Combined Arms Team Trainer, currently under development by the Army, consists of attack aircraft, scout aircraft and a battle captain requiring aviators to integrate their maneuver as a member of a team. With current constraints on flying hours, ammunition and ranges, today's aviators must be prepared to train using simulation. The days of unlimited flying hours and unlimited ammunition have gone forever. As aircraft and ammunition become more expensive the need for simulation becomes greater. Today's high technology visual simulators offer training benefits that in some areas exceed the training possible in the actual aircraft being simulated.

The task remaining, and it is a great one, is for every aviator to accept simulators as an alternative to training in operational aircraft. Training through simulation today is the answer to being prepared to face the challenges of the battlefield tomorrow.

MONTHLY WRITING AWARD

FLYING NAVY STYLE





As we in Army Aviation continue to refine our capabilities for rapid deployment, the ability to operate from Navy ships, as in Grenada's *Urgent Fury*, becomes increasingly important. Here the author provides an insight into helicopter flying.

Major Lew Jennings
Tactical Air Control Squadron TWELVE
NAB Coronado, CA

Special thanks to the photo crew aboard USS *Belleau Wood;* PH2 Sherley, PH2 Anglada, PH2 Gilbert, PH3 Summers, PHAN Myers, PHAN Fuller, PHAN Klein.

YOU JUST TOOK off from homebase with the general onboard. Your mission is to fly out to a big ship off the coast so the general can attend a meeting with the Navy and Marines for an upcoming exercise.

No sweat! You've heard it's a little different flying aboard ships but those Navy guys haven't seen how great you are at terrain flight, confined areas and tactics. You're the "Ace of the Base" and landing aboard a big helicopter carrier deck should be a piece of cake. You give a call after your copilot dials in the frequency operations provided in the mission brief:

"Control this is one-zero, over."

"One-zero this is control. Say your state and souls. My gadget's bent so can't give you pigeons, but take cherubs four, mark your father, strangle your parrot, current B-R-C is two-eight-zero. Altimeter two niner niner two. Contact primary with a see me. Expect starboard dee, over."

You look at your copilot. He looks at you. What was that? Maybe we ought to file a meaconing, instruction, jamming and interference (MIJI) report or something because that sure wasn't any English I've every heard of.

You check to make sure the general isn't listening in. You're thinking this may be tougher than you planned.

Well, it's really simple. Let's examine this Navy style and keep our fingers crossed that it's more "just a job" than "an adventure."

"This is control." The big helicopter carriers have a helicopter direction center (HDC) onboard

FLYING NAVY STYLE

LEFT: **Similar to an air route traffic control center, air controllers and status board keepers in the helicopter direction center direct helicopter traffic and maintain status of your fuel state and souls onboard.** ***ABOVE RIGHT:*** **AC1 "Cap" Caplinger uses radar to direct helicopter traffic in the helicopter direction center aboard the amphibious assault ship USS *Belleau Wood.***

the ship. Similar to an air route traffic control center, the HDC houses air controllers and their radars to guide you. All use the word ***"control"*** preceded with their callsign.

Now you know you're talking to the right folks.

"Say your state and souls." Status board keepers are standing by in HDC to record your fuel state in hours and minutes of flying time and how many passengers you have onboard. While it's a big ship, there are only a handful of landing spots available, so HDC needs to keep track of everyone's fuel state to ensure a spot is available when you're getting low on fuel. If for some reason there isn't a spot available, they need to know how many souls are onboard to make sure they get everyone plucked from the water when you ditch.

"My gadget's bent so can't give you pigeons." The controller is letting you know his equipment isn't working so he can't identify you or provide *pigeons* which is Navy for bearing and distance to a known point.

"Take cherubs four." *Cherubs* is altitude in hundreds of feet. *Angels* is altitude in thousands of feet.

"Mark your father." Since the controller can't identify you on his radar he's asking for your location in reference to the ship's tactical air navigation (TACAN) or *father* in radial and distance measuring equipment range. By the way, the ship is also known as *mother.*

But you don't have a TACAN!

How true. The Navy guys wouldn't know what to do without it. But you have frequency modulated (FM) homing so you can ask control to give you a short count on very high frequency-FM to determine direction to the ship.

"Strangle your parrot." Easy. Since his radar is down anyway, the controller is asking that you stop *squawking* (transmitting) your transponder.

"Current B-R-C is two-eight-zero." The heading of the ship, or base recovery course, is two-eight-zero degrees. Since the ship is westbound in this case, it enables you to visualize where you are in

LEFT: **Navy Commander Joe Denigro, air boss, orchestrates all activity on the flight deck from his perch in primary flight control.** ***TOP RIGHT:*** **Marine CH-53 on final approach.** ***BELOW RIGHT:*** **The landing signal enlisted man, or LSE, directs a Marine CH-46 helicopter on final approach to spot five aboard the USS *Belleau Wood.***

relationship to the ship, e.g., port, starboard, astern, forward, etc. Read on, we'll explain that too.

"Contact primary with a see me." When you have the ship in sight contact the tower for landing instructions, e.g., *"Primary, this is one-zero, 5 miles off your port beam with a see you."*

"Expect starboard dee." There are two holding or delta patterns at the ship to get you sequenced for landing.

Starboard Delta is a clockwise racetrack pattern flown at 300 feet on the right, or starboard, side of the ship.

Overhead Delta is a counterclockwise pattern flown at 1,000 feet directly overhead the ship.

Now you're talking to primary and established in the starboard delta when the air boss gives you a call.

"One-zero you're cleared for the break." The air boss wants to get you into the landing pattern on the left side of the ship known as Port Charlie.

Port Charlie is flown at 300 feet, left turns, for landing to most of the spots which are located on the port side of the ship. How do you get over there?

Continue the starboard delta pattern until you are about 200 yards past the bow or pointy end of the ship where you will be ready to turn left, or *break across the extended centerline of the bow. You call "ready for break" and air boss responds:*

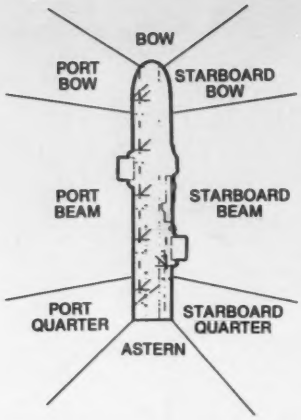


FIGURE 1: VFR relative position reporting.

When contacting primary flight control for landing instructions report your position in nautical miles and relative location from the ship, i.e., "FIVE MILES OFF THE PORT BEAM."

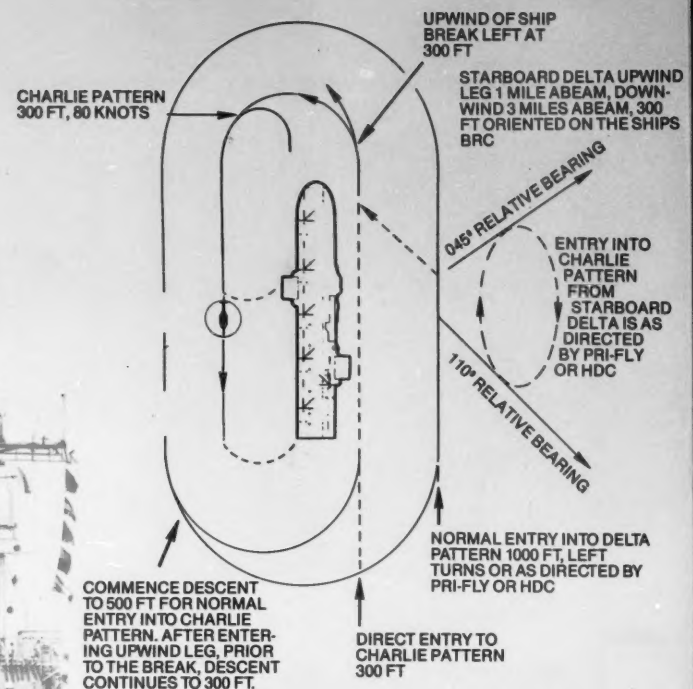

UPWIND OF SHIP BREAK LEFT AT 300 FT
CHARLIE PATTERN 300 FT, 80 KNOTS
STARBOARD DELTA UPWIND LEG 1 MILE ABEAM, DOWNWIND 3 MILES ABEAM, 300 FT ORIENTED ON THE SHIPS BRC
045° RELATIVE BEARING
ENTRY INTO CHARLIE PATTERN FROM STARBOARD DELTA IS AS DIRECTED BY PRI-FLY OR HDC
110° RELATIVE BEARING
NORMAL ENTRY INTO DELTA PATTERN 1000 FT, LEFT TURNS OR AS DIRECTED BY PRI-FLY OR HDC
COMMENCE DESCENT TO 500 FT FOR NORMAL ENTRY INTO CHARLIE PATTERN. AFTER ENTERING UPWIND LEG, PRIOR TO THE BREAK, DESCENT CONTINUES TO 300 FT.
DIRECT ENTRY TO CHARLIE PATTERN 300 FT

FIGURE 2: Delta and Charlie patterns for helicopters.

The USS *Belleau Wood* (CHA-3) is a flag ship, command center, air route traffic control center, helicopter carrier, landing craft carrier, troop carrier, and the largest hospital afloat with 300 beds, 4 operating rooms and 3 dental stations.

"One-zero you're cleared for the break. I'll be taking you into spot five. Call your seat." The air boss is orchestrating all the activity on the ship to ensure your safe landing. He's asked the skipper to steer a course that provides the best relative wind for your type of aircraft with the least amount of pitch and roll to the flight deck. He is also talking with his landing signal enlisted (LSE) men, to get them positioned at spot five. The LSEs need to know which pilot, left or right seat, is flying the approach so they can be in a position where you will see their hand and arm signals.

"Primary, one-zero's abeam, left seat." You broke across the bow's extended centerline slowing to 80 knots at 300 feet looking for spot five. You know the ship could be steaming up to 20 knots to give you good winds over the deck so you begin your turn to final when opposite, or abeam, the spot on downwind and give a call to the air boss confirming which pilot is shooting the approach.

"One-zero you're cleared to land spot five. Winds 20 degrees starboard at 10 knots." You've kept the pattern tight and are on a mile final getting lined up with the 45-degree stripe on spot five, looking for the LSE wearing a yellow shirt. Ah, there he is just forward of the spot, both arms outstretched overhead and waving you in.

You've completed the prelanding checks, asked your copilot to monitor the approach and gauges, and requested the crewchief to let you know when you're safely over the deck.

You're established on a normal approach angle, maintaining a brisk walk closure rate, and crosschecking with the LSE's signals, the landing spot and the ship's superstructure for visual clues.

FIGURE 3: Shipboard Safety Procedures (NAVAIR OO-8OT-106).

1. Personnel shall not approach or depart a helicopter while rotors are being engaged or disengaged.
2. Helicopters shall not be deck taxied on the flight deck.
3. Helicopters shall not be towed or pushed while rotors are engaged.
4. Helicopters shall not be launched or recovered and rotors shall not be engaged or disengaged while the ship is in a turn.
5. A helicopter shall not be flown over another aircraft on launch.
6. Only spots that afford visual reference to the deck shall be used for night helicopter launches.
7. Personnel required to be in the area of operating helicopters shall exercise extreme caution and observe the signals/directions of the LSE or combat cargo representative, as appropriate.
8. Dual engine helicopters shall not be intentionally hovered single engine over a deck spot. If topping checks cannot be performed in contact with the deck, they must be performed in flight at an appropriate altitude.
9. All personnel on the flight deck during flight operations shall wear cranials (helmets), eye protection devices and flotation equipment.
10. Maintenance on and preflight of any portion of an aircraft which extends beyond the ships deck edge is prohibited.
11. Cranials and flotation equipment will be worn anytime climbing upon aircraft for preflight and/or maintenance.
12. Observe mandatory signals = waveoff, hold.

As you reach the deck edge you turn the helicopter parallel to the deck terminating over the landing spot at a hover.

The landing spot is a large "L" with a stripe bisecting the "L" at a 45-degree angle. On amphibious assault ships, LHAs and LPHs, the skids of your UH-1 Huey should be positioned in such a manner where the toes touch the bottom of the "L." The helicopter should be centered on the upper part of the "L" on both types of ships.

You continue to watch the LSE's signals as he directs you over your touchdown area on the land-

Proper safety gear and clothing are a must for flight deck operations. In addition to head, eye and ear protection plus flotation vest this LSE is wearing extra clothing and a face mask to ward off the bitter cold of winter in Korea during Team Spirit 84.

Initial Contact with the Helicopter Direction Center

1. CALLSIGN
2. POSITION (Distance and Bearing from the ship)
3. ALTITUDE (CHERUBS/ ANGELS)
4. FUEL STATE (hours and minutes)
5. SOULS ONBOARD

Note: Pilots shall report a "see you" when visual contact with the ship is gained VMC.

Initial Contact with Primary Flight Control (PRI-FLY)

1. CALLSIGN
2. POSITION (VFR Relative Position)
3. ALTITUDE (CHERUBS/ ANGELS
4. FUEL STATE
5. SOULS ONBOARD

Traffic Pattern with PRI-FLY

1. AT THE BREAK
2. ABEAM FOR LANDING PLUS LEFT OR RIGHT SEAT APPROACH (Left seat approaches not authorized to LHA spot #2 and/or immediately behind tail rotor aircraft)
3. WAVE-OFF (A Wave-Off is mandatory whenever a Wave-Off signal is given by the LSE or pilot loses sight of LSE on approach)

Prior to Launch with PRI-FLY

1. CALLSIGN
2. SPOT NUMBER
*3. FUEL STATE
*4. SOULS ONBOARD

*Prior to initial take-off and/or any subsequent change in passenger load/fuel endurance.

FIGURE 4: Radio Call Requirements.

ing spot. Once he gives the signal to land, you firmly plant the helicopter on the deck and look to the LSE for the signal to chain you to the deck, disembark the general and signal you to go to flight idle.

Everything must be agreed upon between you and the LSE and/or primary before it happens.

This includes start-ups, shutdowns, embarking and debarking passengers, takeoffs, landings and anything involving the movement of the aircraft or personnel...SAFETY, SAFETY, SAFETY!

Ace is still mulling over his MIJI report when his copilot dials in number 2 and transmits, ***"Control, this is one-zero, good morning. Sorry to hear your gadget's broken. We're feet wet with two plus zero and five souls with a code. Negative TACAN. Can you give us a short count on HD-three for a homing signal to mother, over?"***

Ace, astonished, looks at his copilot.

"Bob, how did you know what that gibberish meant?"

"No sweat Ace. It's really simple. I made a copy of this here *Aviation Digest* article . . ."

FLYING NAVY STYLE

The flight deck chief petty officer instructs a new LSE in proper hand signals to assist the Marine CH-53 pilots in safely landing on deck.

ANGELS	Altitude in thousands of feet
BRC	Base recovery course
BINGO	Divert, divert field
BUSTER	Obtain/maintain maximum speed
CCA	Carrier controlled approach
CHARLIE	Clearance to land; a number suffix (if applicable) indicates time delay in minutes before landing may be anticipated
FATHER	Ship's TACAN
FEET DRY	Overland
FEET WET	Overwater
HDC	Helicopter direction center
ISLAND	Superstructure of the LPH/LHA
MOTHER	The Ship
PARROT	Transponder
PIGEONS	Bearing and distance to known point
POGO	Return to last assigned frequency if no contact experienced on newly assigned frequency
POPEYE	Entering instrument meteorological conditions
PIM	Point of intended movement for the ship
PRIMARY	Primary flight control

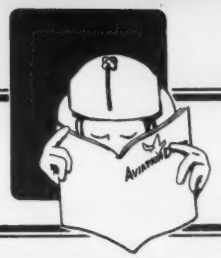
FIGURE 5: Navy Terminology.

ABOUT THE AUTHOR

Major Lew Jennings is a former Warrant Officer Rotary Wing Aviator Course distinguished graduate; chief warrant officer, United States Army, Europe Aviator of the Year; and veteran of more than 700 air cavalry combat missions in Republic of Vietnam.

A Master Army Aviator, he is currently assigned out of Department of the Army, Office, Deputy Chief of Staff for Military Operations and Plans, with the U.S. Navy's Tactical Air Control Squadron TWELVE as helicopter, medical evacuation, and search and rescue coordinator for the Third and Seventh Fleets. Major Jennings invites reader's inquiries on shipboard helicopter operations. You can write to him at Tactical Air Control Squadron TWELVE, NAB Coronado, CA 92155 or call AUTOVON 987-9591.

VIEWS FROM READERS



Editor:

Reference CW4 Mark O. Winn's article, "What Do You Mean I'm Not In The Aviation Branch," I agree with the thrust of the article, but I suggest that we warrant officer aviators go all the way and wear Aviation Branch insignia on *both* lapels, and ultramarine blue on our dress and mess blues. I believe that the vast majority of warrant officer aviators want to wear Aviation Branch insignia. That is the consensus that I gather when visiting Army Aviation facilities throughout the country and while speaking with warrant officer aviators of all ranks.

The only opposition to this course of action that I have perceived comes from a few senior warrant officer aviators who appear to be misinformed regarding the history of Army Aviation and the establishment of the Aviation Branch. This misunderstanding has resulted in false conclusions and predictions of the demise of the warrant officer aviator, predictions which have absolutely no basis in fact.

Replacing the warrant officer aviator with commissioned aviators would require enactment of new legislation affecting the commissioned officer strength ceiling—a course of action that would have little or no support from the current Legislature. If you're thinking of resurrecting the enlisted pilot, forget it! That experiment has been tried by all the major services, and was found wanting by all. The warrant officer aviator is here to stay.

Another of the *Old Heads* predictions that total integration of the warrant officer aviator into the Aviation Branch would be the first step in the dissolution of the Warrant Officer Branch and the Warrant Officer Corps is just as far off base.

No legal authority has ever established a Warrant Officer Branch or Warrant Officer Corps. Congress did, however, establish the position of the Army warrant officer. The rank of warrant officer is clearly indicated by the insignia that is currently worn on the shoulders of the shirt or blouse, or on the overseas cap. The "Squashed Bug" on the service caps clearly identifies the individual as a warrant officer.

Do we really have to show our warrant status in "triplicate" by wearing the Squashed Bug on the lapels, also? I think not.

Would the wearing of Aviation Branch insignia really be the first step in the demise of the warrant officer aviator? I think not.

All Army aviators should wear Aviation Branch insignia and color as appropriate. I believe that this action would do much to enhance esprit de corps, comradeship and cohesiveness. This action would serve to demonstrate to our brothers in the combat arms that we are all Army aviators first—not commissioned or warrant officer aviators.

I would be proud to be the first warrant officer aviator to pin on Aviation Branch insignia.

CW4 Michael J. Novosel
Ft. Rucker, AL

Editor:

As always, I enjoyed my December issue, but particularly CW4 Mark Wrinn's provocative article, "What Do You Mean I'm Not In the Aviation Branch." Wrinn says so well what needed to be said that I shouldn't muddy the water, but...I feel compelled to add my not so humorous but sincere comments in support of his premise that Aviation warrants belong *to* and *in* the Aviation Branch.

No matter how hard we try, Aviation warrants will never be the contemporaries of the skilled technician whose enlisted service experience earned the privilege of wearing the "squashed bug." We Aviation warrants are younger at acquisition and at promotion to senior warrant rank. We are paid a higher wage and generally have a wider range of responsibilities.

The real question then is, "Are Aviation warrants willing to accept the full range of flight and administrative duties that accrue to being a part of the Aviation Branch?" "Are they ready to be more than *just* pilots?"

Professional warrants are ready to expand their responsibility; some were forced by additional duty or efficiency report to do so. Only a few (perhaps well placed) warrants stand in the way of full integration. Perhaps they harbor a subconscious fear that wearing the branch's historic insignia will somehow precipitate nonflying tasks and additional duty normally relegated to the commissioned officer. It is time to accept that inevitability.

All of that considered, the logic that supports retaining both commissioned aviators and warrant pilots to accomplish the same tasks (regardless of pay equity) is suddenly suspect. Heaven forbid.

CW4 Peter C. McHugh, Ret.
U.S. Army

Editor:

I would like to respond to an article in the November 1984 issue, "The Aviation Warrant Officer and the Aviation Branch," by MAJ Robert S. Christensen and CW3 David L. Day.

This article ends with a challenge for all (presumably warrant officers) allegedly within Aviation Branch to prove worthy of our opportunities and responsibilities. Conversely, I challenge the authors to respond realistically to Aviation warrant officers' concerns instead of presenting the same generalizations we have heard too many times before.

The indicators many of us are experiencing in the field do not ring true with the article. For instance: Aviation commanders have made statements to

the effect that they don't want warrant officers "making commissioned officer decisions"; some units providing liaison officers to "user" units are now required to provide commissioned officers instead of warrants regardless of the experience differential; some units are being required to utilize commissioned officers as mission commanders despite the fact they are not pilots in command again with the more experienced warrants "assisting" (in other words, being told to keep out of it and just fly); and having "commissioned officer only" briefings or meetings on any given subject.

Other indicators are reduced warrant officer candidate inputs to flight school and increased commissioned inputs (articles appearing in various publications advertising for commissioned officers to apply for flight school; instructions to flight surgeons and administrative sections not to process applicants for warrant flight school); reduction of warrants into transition/qualification courses such as fixed wing of 70% with a corresponding increase of commissioned officers; and a somewhat decreased promotion rate for Aviation CW2's and CW3's in the latest promotion board. Further, the strength of the Aviation warrant is being reduced in force by withdrawal of voluntary indefinite status, physical profiles closely scrutinized with an end in removal from flight status, and other junior warrants undergoing selection boards for the granting of voluntary indefinite.

Since this article is the first in an apparent attempt by the Aviation Branch to reassure the Aviation warrant, it comes off more as trying to pour oil on troubled waters: i.e., it isn't very convincing. It seems more like saying, "Don't worry, we'll take care of you, you're all professionals." We've all heard that before ("Your check's in the mail, we are here to help you, etc.") Additionally, when I see a column in a recent edition of the Warrant Officers Association Newsletter by the Warrant Officer Division chief virtually ordering all CW4s to stop asking questions regarding future assignments like we were all basic trainees, and again nearly insulting those warrants who turn down selection for attendance at the senior course as refusing to be "honored" for attendance at their Branch's highest military education, then I begin to seriously wonder. Do the authors of the *Digest* article and our Branch chief seriously think that senior commissioned and noncommissioned officers don't question their future assignments?

As for career courses, the *Digest* article points out several changes made to warrant courses, but again, does anyone seriously expect warrant aviator graduates to be utilized as anything other than pilots? Does an additional skill identifier really mean that one will be assigned as an important member of division or higher staff? Hardly—yet there are exceptions such as safety officers and some standardization officers—and with another indicator those may be commissioned-only jobs as well.

This indicator, annotating other "changes" within the warrant aviator corps, was a study conducted last year by the Department of the Army, requesting addressee opinion with justification regarding changing all unit level Aviation safety and instructor pilot positions from warrant to commissioned officer. I understand most responses were against such changes, but that seems to fly in the face of the article in question. One must remember that the studies of today become the policies of tomorrow. One must also remember that it's easy to go from commissioned-only IP and ASO to pilot in command. I was around in the middle 1960s when commissioned officers were aircraft commanders as soon as they hit the door, but as a warrant it took 2 or 3 months to become so qualified—no matter if the commissioned aviator only had the "quickie" transition course and couldn't land or takeoff.

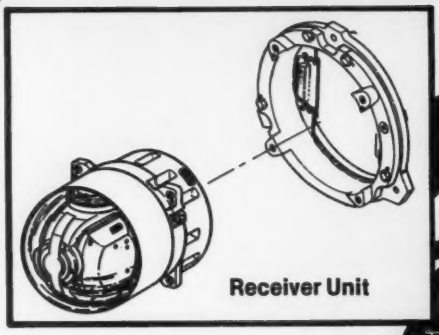
Also, the latest DA-level publications dealing with officer management include a short paragraph on the warrant, to wit: no information regarding warrant management is available because warrant management is under review and revision. Accordingly, commanders think that warrants don't need to attend classes on efficiency report preparation because "we don't need them."

Maybe, as I said in my response to that DA study (to which I never received acknowledgement), the day of the warrant aviator is indeed passing. If that's the case so be it: but viable alternatives must be offered right up front—not couched in officialese. I offer the following thoughts: continue with the Aviation warrant program as a cost-effective method of acquiring aviators, but then offer several options. One might be to remain a warrant and with only the possibility of making PIC; another to attain a 4-year degree and be commissioned after a certain period of time; another to attend OCS after 2 years of college and a period of warrant service (does the Navy's Limited Duty Officer program sound familiar?); or simply be called "noncareer," serve his obligation and leave the service.

In summary, generalizations, appeals to patriotism, platitudes and insulting newsletter columns don't go very far in allaying valid concerns about the future of the Aviation warrant. The general feeling is that we were sure good enough as a cheap pilot source for Vietnam, but now we're just E5s with club cards and something has to be done. What will really settle minds are factual plans for the integration of the warrant into Aviation Branch, plans for us by grade in command structures, plans for career course graduates on higher level staffs up to and including DA, and unit manning by grade. Unfortunately, with some of the attitudes, policies written and unwritten and personalities within the present and future Aviation Branch, my concerns remain solidly in place. I remain

CW4 James P. Fazekas
APO New York

Articles from the *Aviation Digest* requested in these letters have been mailed. Readers can obtain copies of material printed in any issue by writing to: Editor, *U.S. Army Aviation Digest*, P.O. Drawer P, Ft. Rucker, AL 36362-5000.



AIRBORNE LASER TRACKER

Sergeant First Class John H. Murphy
Department of Aviation Trades Training
U.S Army Aviation Logistics School
Fort Eustis, VA

THERE YOU ARE, kicked back in your new Modernized Cobra waiting for a mission. The call comes telling you that just over the tree line a ZSU-23-4 has set up and that you are to remove it. As you unmask, you and your copilot spend 2 or 3 minutes looking for the target but all you can see are trees. Then you notice rounds coming at you from what you thought were trees. As you go down, your last thoughts are that you wish that you had seen him before he saw you.

Now, you have a new system for your Cobra that will allow you to find targets just as soon as you unmask. That system is the airborne laser tracker (ALT).

Mounted high on the helicopter in the sail, the ALT is designed to reduce the time needed by helicopter crews to sight, aim and fire air-to-ground weapons. The ALT relies upon a target spotter (a soldier on the battlefield itself or in another helicopter) who, equipped with a laser designator, can train a coded laser beam on the target (see figure lower left, page 13). The ALT onboard the attack helicopter uses a receiver that can detect the low level energy reflecting from the laser spot. The ALT scans the terrain, finds and tracks the target and its output can be used to aim the helicopter's telescopic sight unit onboard the helicopter for firing.

The airborne laser tracker is an example of the Army's program to modernize the AH-1S (MC) Cobra helicopter. The ALT allows the OH-58D Kiowa, AH-64 Apache and the AH-1S to work together on the modern battlefield. A target can be designated by the OH-58D, the AH-64 or a forward observer equipped with a laser designator. Now

the AH-1S's crew will not have to scan the battlefield looking for a target, because with the flick of a switch, the Cobra's telescopic sight would be automatically slewed to the target that is being designated. This reduces the time that the helicopter is exposed to detection by hostile fire.

Developed by Rockwell International Corporation and the U.S. Army Night Vision Laboratory, the airborne laser tracker consists of three line replaceable units that can be quickly changed by unit maintenance personnel.

The receiver is a barrel-shaped housing with a glass dome. This unit, located in the aircraft sail, contains the laser seeker which senses reflected laser energy from the target. The electronics unit also is mounted in the sail just behind and below the receiver, see figure lower right. Contained within this "black box" are the plug-in modules and power supply that interface the ALT with the Cobra. A control panel located in the pilot's cockpit permits code and operating mode selection.

Alignment of the ALT is provided by way of a mount that allows azimuth and elevation adjustment. The current boresight alignment ground support equipment is used to align the mount when the system is first installed onto the helicopter. Because the mount, not the receiver, is aligned to the helicopter the system does not have to go through boresight when the receiver is replaced.

Aviation intermediate maintenance support personnel will use the AN/AAM-55 ALT Test Set to troubleshoot the system. This 33.5 pound test set consists of a stand (to mount the receiver) and interconnecting cables that permit testing of the receiver and electronic unit. The control panel is tested with a multimeter by performing continuity checks.

The ALT system is divided into four functional areas. These are built-in-test (BIT), scan and standby modes, target acquisition and tracking, and servo control loop. The BIT provides a self-test routine for the ALT. BIT is started by placing MODE switch in TEST position. The BIT system commands place the system into a caged mode, a single-bar scan mode and turn on the light emitting diode to track the optical signal. Various voltages are checked while the system is in these different modes. If a system failure is found, the BIT test is stopped and a FAULT lamp on the control panel will light. If the system goes through BIT without a failure the TRACK and GO lamps will light. The pilot can select from two scan patterns or place the system in a standby mode. In standby, the system is caged and ready for scanning or tracking. The system will not enter track until one of the scan modes is selected and a valid target is present. Target acquisition and tracking permit the screening of laser signals to determine if one of the correct codes is detected. When the correctly coded laser energy is detected, tracking command signals are passed to the servo control loop as elevation and azimuth servo commands. Combinations of these signals are used to position the platform assembly in the caged, scan and tracking modes. These signals are also sent to the telescopic sight unit during the ALT acquire mode. This enables the copilot to visually acquire the target.

New equipment training will be performed by the Communications and Electronics Command and a separate functional course will be established at the U.S. Army Aviation Logistics School at Ft. Eustis, VA, in 1987 to accommodate sustainment training.

As you can see, the U.S. Army continues to update its current aircraft systems as well as develop new helicopters. The new ALT will significantly enhance attack helicopter operations, allowing you to see the enemy before he sees you.

Painting a coded laser beam on a target

Lieutenant Colonel James B. McKenzie Jr.
Editor, AirLand Bulletin
TAC-TRADOC AirLand Forces Application Agency
Langley Air Force Base, VA

ALFA AGENCY

THE AIR FORCE'S Tactical Air Command (TAC) and the Army's Training and Doctrine Command (TRADOC) have joined forces. The resulting relationship has been highly productive in furthering the development of AirLand Battle concepts.

The interface of the commands was formalized with the establishment of the Joint Actions Steering Committee (JASC). The JASC currently is cochaired by the Deputy Chiefs of Staff for Plans (TAC-XP) and Doctrine (TRADOC-DCSDOC). As the JASC function became more demanding and the amount of joint activity swelled to the point where an agency was needed to manage day-to-day actions, the AirLand Forces Application (ALFA) Agency was created in 1975 to meet that need.

ALFA is located at Langley Air Force Base, VA. To perform its unique mission, ALFA is authorized 10 officers—5 Army and 5 Air Force. The ALFA director position will normally rotate every 18 months between the Army and the Air Force. The incoming director should be assigned 6 months prior to assuming the directorship. The present director is COL George H. Peacock, Air Force, and the incoming director is COL George M. Mullen, Army.

The agency's mission is embodied in a joint TAC-TRADOC regulation which states that, "The mission of ALFA is to coordinate, integrate and manage activities associated with joint TAC-TRADOC efforts regarding improved concepts and procedures for the conduct of the AirLand Battle."

ALFA's goal is to develop the concepts and procedures necessary to win the AirLand Battle, and to define joint needs in terms that enhance resource decisions. Three products result—joint concepts, procedures and needs. The action officers (AOs) work relatively unconstrained by doctrinal issues or roles and missions disputes. Their objective is to manage the development of concepts and practical procedures. When tasked, the AOs support their work with the analysis necessary to identify shortfalls and joint needs.

This diversity of joint efforts raises the next point, which is how joint work gets started. The work centers on the priority concerns of the TAC and TRADOC commanders and the JASC. A recommendation for joint work may be made to the JASC, or the JASC may task ALFA in response to staff and departmental initiatives. In any event, the JASC must jointly agree to an

undertaking before ALFA becomes a player.

ALFA's role is managing and coordinating JASC-directed joint work. Consequently, the AOs have broad operational backgrounds rather than narrow technical expertise in detailed aspects of the modern battlefield. The JASC has tasking authority to form joint working groups from within the TAC and TRADOC staffs and subordinate organizations, since this is where the technical skills exist to work many of the problems. Frequently, these groups also include worldwide representation down to squadron and battalion level in order to obtain direct field input. The draft products from these joint working groups are provided to TAC-XP and TRADOC-DCSDOC for staffing with other headquarters as they deem appropriate.

Inherent in the joint task is the formulation of products which have the hard-cover manuals of the two services. Some efforts, such as joint mission area analyses, support the requirements documents of the two services. Other efforts have resulted in TAC-TRADOC publications, such as "Joint Suppression of Enemy Air Defenses (J-SEAD)" (TRADOC TT 100-44-1). ALFA seeks to formalize Army-Air Force cooperation by producing joint publications. While ALFA does not have the authority to publish biservice manuals, TAC-TRADOC efforts have influenced those who write uniservice manuals.

The TAC-TRADOC dialogue has expanded to include the U.S. Atlantic Fleet at Norfolk, VA, and the Marine Corps Development and Education Command (MCDEC) at Quantico, VA. Memorandums of Agreement were signed in the spring of 1984 to define the Fleet's and MCDEC's interaction with TAC and TRADOC. The work with both Atlantic Fleet and MCDEC focuses on joint concepts, tactics and procedures, not on service doctrine. Although there are no Navy or Marine officers at ALFA (representation from those services remains a goal), Atlantic Fleet and MCDEC representatives do participate in JASC meetings and meetings between the commanders. Furthermore, Atlantic Fleet and MCDEC are now involved in five of ALFA's eight current projects. ALFA is optimistic that the working relationship with both Atlantic Fleet and MCDEC will result in the products to help improve joint capabilities.

ALFA frequently coordinates with a similar agency in Europe: the Directorate of AirLand Forces Application (DALFA). DALFA serves the Deputy Chiefs of Staff for Operations at both U.S. Air Forces Europe, and U.S. Army Europe, which also function as a Joint Actions Steering Committee. DALFA serves as ALFA's primary point of contact with U. S. forces in Europe. ALFA receives information from DALFA on all of its projects and products, and provides the same to it.

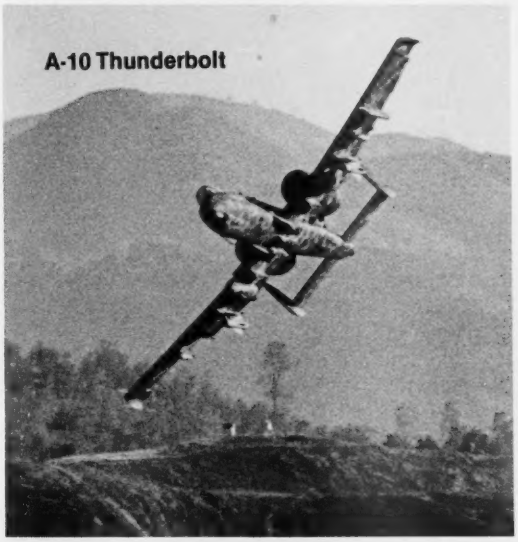
ALFA's role in the TAC-TRADOC dialogue can be characterized in one of three ways: As a manager, where ALFA assumes overall responsibility for a project; as a participant, in efforts managed by others; and finally, as an expediter, bringing together elements of the two staffs on items of common interest. Daily, a wide variety of TAC-TRADOC actions are worked between action officers on each staff. ALFA functions like a switchboard, exchanging ideas and making the appropriate connections.

In summary, the TAC-TRADOC dialogue is active and working. Furthermore, ALFA is encouraged by the recent Navy and Marine Corps involvement in the TAC-TRADOC dialogue, which promises to broaden the work and produce results beneficial to all four services. The bottom line is that the services are working together to meet the challenges of future air, land and sea battles.

NOTE: Contact with ALFA can be made by writing to: ALFA Agency, HQ, Tactical Air Command, ATTN: XP-ALFA, Langley AFB, VA 23665-5001 or ALFA Agency, HQ, Training and Doctrine Command, ATTN: ATDO-ALFA, Ft. Monroe, VA 23651-5000. ALFA may also be reached by AUTOVON 432-5934 or 680-2589.

During the next few months the *Aviation Digest* will cover several ALFA projects. Watch for:

- "Joint Attack of the Second Echelon."
- "Joint-Rear Battle."
- "Joint Tactical Deception."



A-10 Thunderbolt

photo by David B. Lindsay

Human Factors Investigation

John L. Wenrich Jr.
Directorate of Training Developments, Investigation and Education
United States Army Safety Center
Fort Rucker, AL

PROBABLY NO topic is talked about, maligned, lamented, criticized or commented on more than the subject of human factors in accident investigations. We have all kinds of sophisticated techniques for analyzing materiel failure, and for reconstructing the accident itself, but human factors investigation lags among the specialty areas.

Human factors is defined as the science of applying behavioral principles to systems. It represents the beginning of a variety of applied sciences having to do with a human's structure, functioning and behavior. It is interdisciplinary. Anatomy and physiology, anthropometry, kinematics, work performance, environmental stresses in sensory and perceptual behavior; as well as learning, training and motivation; are all disciplines which contribute to the field of human factors.

The overall objective of human factors engineering and investigation is to prevent human error from causing future accidents. The evidence can be elusive when we attempt to get at the underlying "whys" of human behavior, which so many times are the real cause of injury and death in Army accidents. Again and again, statistics indicate more than 80 percent of all accidents, both aviation and ground, are human-error related. We either design them wrong, we build them wrong or we use them wrong.

Our progress in human factors accident investigation is disappointing in many respects. Accident investigators are human and introspective. Our many years of investigative experience and long hours of observing and reporting the mistakes of others, lead us to believe that we ought to be able to analyze and solve human problems. But in spite of the fact that we have some reason and basis for thinking, feeling and believing that we have "a handle on the problem," we still have a long way to go.

We must distinguish between the two major divisions of human factors investigation: injury causation and human involvement in the accident cause. The more extensive and traditional injury causation investigation for purposes of crashworthiness and survivability looks at what the injuries were, how they were sustained and what sequence of events led up to them. We get involved in reconstructing the crash sequence, analyzing what the crash dynamics were, the adequacy of the restraint system, the emergency equipment available and the direct and indirect consequences of fire. We are interested in crash/fire response, the timeliness of arrival and effectiveness of the fire fighting equipment and subsequent care of the survivors. We attempt to correlate occupant injuries with the events, conditions and circumstances that may have contributed to the injuries. Con-

Pilot error involves aircraft in whiteout. The crew of this UH-1M were following the correct procedures by landing after discovering a partially open cargo door. However, when the pilot stopped the aircraft at what he thought to be a high hover, he was approximately 10 feet agl. Without airport lights or other visual cues, he allowed the descent to continue. The aircraft became engulfed in rotor-induced blowing snow and the crew lost outside visual reference. The aircraft's right skid hit the ground and it rolled right, coming to rest inverted.

siderable time and effort must be devoted to documenting the injuries and reconstructing the sequence of events.

Perhaps the more obvious and important division of human factors investigation is the human involvement in accident causation. Much has been said and written about human factors, but complete understanding remains elusive. We must get to the underlying "whys" in order to explain the reason the accident happened. In most cases, it is fairly easy to reconstruct what happened, but often there is no solid evidence to enable us to state conclusively the reasons for the human performance which caused the accident. We are confronted with the limitations or shortcomings of the sensation, perception, cognition, judgment or reaction which produced or led to faulty or inadequate human performance. We must also try to determine the extent to which such factors as equipment design, space layout, operating procedures, management practices, prior training and the physical environment affected human behavior which led to the accident.

Finally, we must try to determine whether operator impairment or incapacitation was involved. If there was impairment, was it a result of fatigue, pre-existing medical problems (either physical or mental), exposure to toxic substances or ingestion of alcohol or other drugs? We must document operator behavior and the potential factors affecting that behavior. This systematic effort to explain the underlying reasons for the human behaviors disclosed during the human factors investigation leads back to accident prevention, the main purpose of an accident investigation.

That's a tall order, and a very difficult one to fill. Human factors investigation is not an exotic new approach designed to solve all the problems. In fact, all of these human factors are currently being looked at during our investigations. However, a more systematic and thorough approach in the human performance investigation process is required. To ensure a thorough investigation and analysis, the safety investigator must use a scientific approach. He must develop a hypothesis, gather data to test the hypothesis, analyze the data and finally draw conclusions.

Too often, the investigator develops a hypothesis based on prior experience and knowledge, and then goes searching for the facts to support it, tending to ignore any facts which might discredit it. It is nearly impossible for anyone to free himself or herself completely from preconceived ideas which might bias an investigation, but it is important to arrange the conditions or observations so that individual bias will not distort the results. This sometimes requires elaborate stratagems to enable the investigator to ignore his or her own bias and be objective.

Experience and knowledge that often cause the investigator to make the mistake of testing only a selected hypothesis are the same experience and knowledge that, when channeled in the right direction, allow the investigator to conduct a more thorough human factors investigation. The final conclusions of such investigations will help us reach the root cause of human error accidents. Anything less than this kind of professional commitment can leave us essentially still in a primitive stage in accident prevention.

About the Author

Mr. John L. Wenrich Jr., has served as an aviation and ground accident investigator with the U.S. Army Safety Center since February of 1984.

Wenrich's federal service includes many aviation-oriented positions in such areas as flight simulators, aviation training aids, and audiovisuals.

For 9 years of a 20-year aviation career in the U.S. Marine Corps, Wenrich was an aviation safety officer. He served combat tours in Korea and Vietnam and was awarded 28 Air Medals for aerial combat in Vietnam.

Wenrich holds a B.S. degree in Business Management and an M.S. degree in Safety Management from Southwestern University where his thesis was in Human Factors Investigation. He has completed the Naval Post Graduate School, Aviation Safety Officer School, and is a graduate of the Accident Investigation and Reconstruction School, International Center for Safety Education, Tempe, AZ.

Wenrich is a member of the American Society of Safety Engineers, Federal Safety and Health Professionals and International Society of Aviation Safety Investigators.

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Tammy Moury photo by Steve Dougharty

Film, Camouflage, Jungle and Desert—Unauthorized Use

I refer you to the article Camouflage for Helmet in the May 1982 PEARL'S. Since that time, new light has been shed on the subject.

Subject films (Jungle), NSN 8475-00-173-9054 and (Desert), NSN 8475-01-094-4566, are not authorized for use with helmet, flyer's SPH-4, NSN 8415-00-144-4981/4985.

The U. S. Army Aeromedical Research Laboratory (USAARL) determined that use of film on the helmet shell is a safety hazard. A proper inspection on the helmet shell cannot be accomplished when this tape is applied. If there is a delamination or fracture in the shell, the film would prevent detection.

Maintenance personnel at U. S. Army Troop Support Command (TROSCOM) advised that the updated TM 10-8415-206-13, when published, will not include the film as an authorized item for use with the SPH-4 helmet.

Maintenance point of contact at TROSCOM is James Angelos, AUTOVON 693-3880.

USAARL point of contact is Joseph Licina, AUTOVON 558-6881/6897.

SRU-21/P Survival Vest

Aviation life support equipment (ALSE) message 84-6 concerning relocation of components in the SRU-21/P survival vest has generated a lot of response from you users. Great! This proves the ALSE messages are getting out to you. There is some concern here at AVSCOM, however, as many callers are claiming that with all the equipment they have in their survival vest they cannot make the necessary changes to comply with ALSE message 84-6.

Natick Research and Development (R&D) Center and AVSCOM worked on the change a long time prior to the message being transmitted. All the evaluations were conducted on survival vests that had only the mandatory components installed. (Those in the Supply Catalog (SC) 8465-90-CL-P02, July 1978.) There was no problem with the relocation of the strobe light with flash guard and water storage bag. The reason for the relocation was to have the signaling device, the strobe light, in an area easily accessible by either hand.

PEARL's article in *Aviation Digest,* May 1984, showed the required location of the mandatory items in the SRU-21/P survival vest. The location was a reproduction of Natick R&D drawing 11-1-1783 which shows the authorized location of items from the SC 8465-90-CL-P02. Although PEARL'S is not regulatory in nature, the drawing came from an official source and showed the location of the then current items.

Reissue of Interim Change 101 To AR 40-61, "Medical Logistics Policies and Procedures"

The following is reprinted from ALSE message 85-1, 111600Z Jan 85.

The interim change to AR 40-61 expired on 22 October 1984. DASG-HCL-S message 171430Z Oct 84 advises that the interim change will be reissued with a new expiration date of 22 October 1985. Interim change 101 established policies and procedures for management of controlled items in Aviation survival kits. The reissued change will contain the same guidance as the previous one and will remain in effect pending publication of a newly revised AR 40-61 in early 1985.

Points of contact are Major Goeringer, HQDA, Washington, DC, AUTOVON 227-8286 and Mr. James Angelos, AMSAV-MCAPS, St. Louis, MO, AUTOVON 693-3889, Commercial 314-263-3889 or FTS 273-3889.

OPERATING INSTRUCTIONS

1. EXTEND ANTENNA — Pull antenna all the way up.

2. TURN RADIO ON — Rotate knob and arrow straight down to 243.0 (voice-MCW) position.

3. TRANSMIT THE FOLLOWING INFORMATION —
   a. MAYDAY — MAYDAY — MAYDAY
   b. Give aircraft call sign, type and number (i.e. Army UH-1, 1234, has crashed at (give best guess or last known position)). Broadcast the above information for 5 seconds. Then listen for 5 seconds, if no answer and no aircraft can be heard in your vicinity, switch to Beacon Mode (BCN).

      DO NOT POINT TIP OF ANTENNA AT RESCUE AIRCRAFT WHEN TRANSMITTING!

   c. At 15 minutes before the hour and at 15 minutes after the hour, repeat a and b above.

4. If aircraft is ELT equipped, use survival radio for voice transmission only.

ANTENNA - Pull up till it stops

SPEAKER - Listen here

PUSH TO TALK BUTTON - Press this to transmit

ON/OFF, FREQUENCY SELECT KNOB

+ Turn arrow straight down to 243.0 frequency position.
+ Turn arrow one more click to the left to select the Beacon (BCN) position for the following:
  * 15 seconds max to signal for rescue aircraft
  * 3 hours max to signal search and rescue satellite

NOTE: You will not be able to hear rescue aircraft transmission while the selector knob is in the Beacon (BCN) Position. Move it to 243.0 Position.

MIRCOPHONE — Talk here

BATTERY CAP

If you do not hear a rushing noise when you turn the radio on— remove the battery cap and check the spring for corrosion. Clean spring off and replace cap.

NOTE: Not mentioned on this card is voice 282.8 Mhz mode of operation. This is the international search and rescue frequency. Operation on this frequency is the same as the voice mode on 243.0 Mhz. For additional details on the AN/PRC 90, see TM 11-5820-800-12.

AN/PRC-90 Radio Operating Instructions

These cards are ideal training aids for your ALSE training classes. You can make these cards locally through the support of your local Training Aids Support Office.

These cards also may be adopted for field use by laminating the card to prevent exposure to the elements and placing it in the radio pocket along with the survival radio.

If you have a question about personal equipment or rescue/survival gear, write PEARL, AMC Project Officer, ATTN: AMCPO-ALSE; 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-1218/9 or Commercial 314-263-1218/9.

1984 Army Aviation Policy Committee and Training Symposium

DURING THE week of 3 to 6 December 1984, major Army command (MACOM) Aviation officers, members of the Department of the Army Staff, Aviation unit commanders and other guests met at the Army Aviation Center, Ft. Rucker, AL, to participate in the annual Army Aviation Policy Committee and Training Symposium.

Major General Johnny J. Johnston, director of training, office of the Deputy Chief of Staff for Operations and Plans, began the meeting with a stimulating keynote address, challenging Army aviators to continue the lead in innovative combined arms training.

For the first time, Army Aviation brigade commanders, and representatives from the numbered armies in the continental United States, MACOMs and corps Aviation officers met for 2 days in a Training Symposium designed to identify areas of concern relating to combined arms training. During that same 2-day period, four working groups made up of representatives from all member MACOMs (instructor pilots, standardization instructor pilots, maintenance test pilots, Aviation safety officers, etc.) reviewed 110 Aviation standardization issues and made recommendations for their resolution. On 6 December, the formal session of the Policy Committee met to review recommendations made by work groups and to reach a consensus on how issues were to be resolved. MACOMs and members from Department of the Army Staff assumed the responsibility for specific issues, and will report back to the Policy Committee at intervals throughout 1985 on progress made in solving these matters.

Some of the issues addressed during the sessions were:

• Two MACOMs submitted requests for long-needed improvements in weight and balance procedures. In response to these issues, U.S. Army Aviation Systems Command has distributed a draft revision of AR 95-16 to MACOMs for review and comments. The revised regulation should be distributed to users by the end of fiscal year (FY) 1985.

• Some Aviation units were unable to have Aircraft Maintenance Officer Course Phase II trained maintenance test pilots by 1 January 1985 and requested extension of that deadline. The decision was made that the deadline will not be extended and that problems will be handled on a case-by-case basis by the MACOMs.

• The U.S. Army Safety Center will begin distributing a nonresident Aviation safety officer/technician qualification course in FY 85, in response to requests by Active and Reserve Component Aviation units.

• Aviation unit Army Training and Evaluation Programs (ARTEPs) have not included air traffic control (ATC) related tasks. Revised ARTEPs will be fielded that include ATC tasks. Closely related to this is a requirement that Training and Doctrine Command review Army ATC training and doctrine this FY.

• Numerous concerns were expressed regarding logging and tracking specific kinds of flight time. More accurate and timely records are needed to enhance assignment and use of Army aviators. Work has already begun on an automated flight records system that will solve the problems discussed during the meeting.

• Draft Change 4, AR 95-1, has been distributed to MACOMs for review and comments. This draft change will permit unit trainers to evaluate some aspects of training such as local area orientations and border qualifications; instrument flight examiners will be authorized to be pilot in command (PIC) when evaluating and instructing; makes the Annual Aviator Proficiency and Readiness Test applicable to aviators in aviator readiness level 1 only and is conducted in the primary aircraft; reference is added to address leasing, chartering and renting commercial aircraft. This regula-

tion and all other 95-series regulations will be published in the new automated UPDATE format.

• As a result of a 1983 Policy Committee decision, OV-1 Mohawk doctrine, training and standarization have been revised and will appear in SEMA (special electronic mission aircraft) doctrine and training publications this year.

• Numerous comments were made concerning how PICs are to be used and what aircrew station will be occupied during flight. The response to these comments is found in HQDA message (DACS-ZB) 151325Z Mar 84, subject: Aviation Safety 84. Evaluation requirements are specified in STACOM dated 21 November, 1984.

• Synthetic flight training systems (SFTS) requirements specified in AR 95-1 were discussed. SFTS use is being reviewed by the Aviation Center to determine changes that can be made to provide more effective training. Changes to aircrew training manuals and AR 95-1 will be predicated on the results of the review.

• Questions that were raised about vertical helicopter instrument flight rules recovery procedures will be addressed in an upcoming article in the *Aviation Digest* and in a draft revision to AR 95-50 that has been sent to MACOMs for review and comments.

Copies of the 1984 Army Aviation Policy Committee Meeting Issue Responses have been distributed to all MACOM Aviation officers. Questions relating to any of these issues should be referred to the appropriate MACOM.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362-5000; or call us at AUTOVON 558-3504, FTS 533-3504 or Commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or 205-255-6487 and leave a message.

U.S. Army Class A Aviation Flight Mishaps

	Number	Flying Hours (estimated)	Rate	Fatalities	Total Cost (in millions)
FY 84 (to 22 March)	21	687,487	3.01	18	39.8
FY 85 (to 22 March)	27	629,947	4.29	24	46.4

AVIATION PERSONNEL NOTES

OPMS Study Group

The Officer Personnel Management System (OPMS) Study Group After Action Report was published in the September-October 1984 Commander's Call and should be read by all officers. There are several changes that were proposed by the study group which will impact on the Aviation Branch. One change that got much attention from aviators is the criterion that an officer will serve in only one branch. This affects such aviators as current 15M35 officers, since they are actually serving both in Aviation and Military Intelligence Branches. Another change is the deletion of SC 71 as a numerical designation. All Aviation logisticians are to be coded as 15T. Changed too are the terms:

Current Term	New Term
Specialty (SC 15)	Branch (15)
Special Skill Identifier (15B)	Area of Concentration (15B—Combat Aviation)
Non-Accession Specialty (41,et.al.)	Functional Area (41,et.al.)

Although the OPMS implementation plan is currently being developed, the study group recommended a transitional strategy with several key features, such as "grandfathering" all senior majors and above, as far as branch transfers.

A outgrowth of the OPMS study was a broader, more indepth examination of the Warrant Officer Corps. This study is called the Total Warrant Officer Study Group and is scheduled for completion in June 1985. Read the September-October 1984 Commander's Call for details.

Army Astronaut Candidate Program

The Army Astronaut Candidate Program Selection Board met at MILPERCEN 14 to 16 January 1985 to select personnel for referral to National Aeronautics Space Administration (NASA) either as pilot or mission specialist astronauts. This was a special board as announced by Deputy Chief of Staff for Personnel message 231445Z November 1984, Subject: Army Astronaut Candidate Program. The Army plans to hold annual selection boards for this program beginning in late 1985. There will be a 90-day window for submitting applications, between 1 July and 1 October each year. The program is open to all Active Army, Army Reserve and Army National Guard personnel regardless of age, sex, race or rank who meet the prerequisites. Applicants for the Astronaut Candidate Program must meet the basic education requirements for NASA engineering and scientific positions, specifically successful completion of a standard professional curriculum in an accredited college or university leading to a bachelor's degree with major study in an appropriate field of engineering, biological or physical science or mathematics.

Applicants for mission specialist positions **MUST:**

- Have at least 3 years of related experience in their qualifying degree. An advanced degree is desired and may be substituted for the experience requirement (master's degree = 1 year, Ph. D. degree = 3 years).
- Be able to pass the NASA Class II space flight physical (similar to, but more stringent than the Army Class II flight physical).

Applicants for shuttle pilot positions **MUST:**

- Meet the basic degree requirements.
- Have at least 1,000 hours pilot in command time in high performance jet aircraft (an aircraft having at least 3,000 pounds of thrust per engine). Flight test experience is highly desirable.
- Be able to pass the NASA Class I space flight

physical (similar to the Army Class I flight physical).

Additional information concerning the Army Astronaut Candidate Program may be obtained by contacting the Aviation Plans and Programs Branch of the Officer Personnel Management Directorate of MILPERCEN, telephone: AUTOVON 221-8156/7, Commercial (202) 325-8156/7; or write: Commander, MILPERCEN, ATTN: DAPC-OPA-V, 200 Stovall Street, Alexandria, VA 22332-0400.

LTC Command Selection

Command selection boards for aviators are now taking an officer's flying hours into consideration as one factor in their deliberations. The Deputy Chief of Staff for Personnel, Army, has directed that an updated copy of DA Form 759—Individual Flight Record and Flight Certificate—be provided to the selection boards by all personnel in the zone of consideration for Aviation command. Accordingly, all officers in the Aviation Branch who hold specialty code (SC) 15 and are under consideration for LTC command selection, are required to provide the most recent copy of their DA Form 759 to: Commander, MILPERCEN, ATTN: DAPC-OPA-V, 200 Stovall Street, Alexandria, VA 22332-0400. Since files are usually prepared for the boards in late November, it is most timely to mail the most current DA Form 759, signed and dated by the aviator in block 17, so that it arrives in Military Personnel Center (MILPERCEN) not later than 15 November. Avoid the Thanksgiving rush!

Commandant's Aviation Logistics Update

IN FEBRUARY 1985, the U.S. Army Aviation Logistics School, Ft. Eustis, VA, began publishing the *Commandant's Aviation Logistics Update*. This update will be published quarterly under the authority of paragraph 4-28, AR 310-2. Its purpose is to provide timely information of an advisory, informative or directive nature concerning training, branch proponent specialty, materiel and doctrine. We intend to provide this information worldwide to Aviation commanders and to units on active duty and in the Reserve Components.

Some units may have received the winter 1985 issue of the *Commandant's Aviation Logistics Update*. If your unit did not receive it, it is because we are still in the process of developing a complete distribution list. To help us develop this list, please send us your unit mailing address along with the number of copies of the *Commandant's Aviation Logistics Update* that your unit requires.

Recipients of the *Commandant's Aviation Logistics Update* are also encouraged to submit articles for publication in future issues. Submit mailing addresses and articles to: Editor, *Commandant's Aviation Logistics Update*, U.S. Army Transportation and Aviation Logistics Schools, Ft. Eustis, VA 23604-5344.

The spring issue will be published in April 1985. We look forward to hearing from you.

FM 1-506 Published

The U. S. Army Aviation Logistics School at Ft. Eustis, VA, has announced the publication of FM 1-506, "Fundamentals of Aircraft Powerplant Maintenance." This manual supersedes TM 55-406, "Fundamentals of Aircraft Powerplant Maintenance." Point of contact for this action is Mr. Green, AUTOVON 927-6661.

Correction

The January issue contained an error in the AVLOG 84 article. On page 42, under the heading "Army Air Transport," the first sentence should have read: The U.S. Army Transportation School . . . rather than Aviation Logistics School.

The *Aviation Digest* regrets the error and any consequent inconvenience.

VHIRP to be Clarified

Mr. Jesse M. Burch Jr.
U.S. Army Aeronautical Services Office
Cameron Station, Alexandria, VA

SEVERAL MONTHS ago USAATCA-ASO sent a letter to the various major Army commands soliciting their views on the validity of the requirement for a vertical helicopter instrument flight rules procedure (VHIRP). The responses that came back indicated that the requirement is indeed valid. The responses also indicated that the VHIRP is much misunderstood.

At USAATCA-ASO we were not satisfied to let this matter drop. We developed an issue paper and brought it up for discussion at the U. S. Army Aviation Policy Committee meeting held at Ft. Rucker, AL, the first week of December 1984. Again the requirement was validated; however, this time it was apparent to all those in the discussion group that the VHIRP program was very much misunderstood by commanders and aviators alike. The outcome of this discussion was that the VHIRP program would continue, and USAATCA-ASO was tasked to explain the VHIRP, to clarify it to the extent that all commanders and aviators will understand it in detail.

Mission impossible you say? Well, USAATCA-ASO has accepted the challenge and intends to do just that! We are going to explain the VHIRP so thoroughly that everyone will understand it. This article is the initial step. It is not intended to explain fully the intricacies of a VHIRP but rather to make you aware of the widespread misunderstanding and to alert you to be on the lookout for future articles, possibly appearing in this publication as well as in others, that will contain a more detailed explanation. Be on the lookout, also, for a revised AR 95-50 which will include detailed information on the VHIRP.

There are a few items that can be cleared up in this brief article:

- **First.** The Federal Aviation Regulations (FARs) do not apply to military pilots. Nothing could be further from the truth! There are only two occasions when the FARs do not apply. First is when operating outside the National Airspace System and then ICAO (International Civil Aviation Organization) or host country regulations apply. Second is ...when it is essential to the defense of the United States because of a military emergency or urgent military necessity... (Public Law 85-726 as amended).
- **Second.** What is a VHIRP? It is an emergency procedure, right? Wrong! It is not! It is a nonstandard operating procedure that has been previously coordinated with, and approved by, an FAA air traffic control facility. It is a contingency plan to be executed as a last resort after exhausting all efforts to maintain visual meteorological conditions, to include landing as soon as possible.
- **Third.** What is a VHIRP for? It is designed to permit the safe recovery of Army helicopters that may encounter instrument meteorological conditions while conducting visual flight rules tactical terrain flight training. Properly developed, a VHIRP will have minimum impact on the air traffic control system and will allow the aviator to recover to a designated airfield or other point of landing without being in violation of the FARs.

Specific questions concerning VHIRP should be directed to Mr. Jesse M. Burch Jr., at AUTOVON 284-7796/6304 or Commercial (202) 274-7796/6304.

Readers are encouraged to address matters concerning air traffic control to Director, USAATCA Aeronautical Services Office, Cameron Station, Alexandria, VA 22304-5050.

HOTLINE

The following HOTLINE numbers can be called on official business after duty hours. They will be updated and reprinted here periodically for your convenience. If your agency has a Hotline it would like included, please send it to *Aviation Digest,* P.O. Drawer P, Ft. Rucker, AL 36362-5000.

		FTS	AUTOVON	Commercial
Armor	Ft. Knox, KY	354-8265	464-8265	502-624-8265
Aviation	Ft. Rucker, AL	533-6487	558-6487	205-255-6487
Aviation Logistics	Ft. Eustis, VA	None	727-3571	804-878-3571
Camouflage	Ft. Belvoir, VA	None	354-2654	703-664-2654
Engineer	Ft. Belvoir, VA	None	354-3646	703-664-3646
Field Artillery, ARTEP	Ft. Sill, OK	None	639-2064	405-351-5004
Field Artillery, Redleg	Ft. Sill, OK	None	639-4020	405-351-4020
Fuels and Lubricants	R&D Center Ft. Belvoir, VA	None	354-3576	703-664-3576
Ground Power Units	Tooele Army Depot, UT	None	790-2129	801-833-2129
Health Sciences, Training	Ft. Sam Houston, TX	None	471-4785	512-221-4785
Infantry, ARTEP	Ft. Benning, GA	784-4759	835-4759	404-545-4759
Infantry, School	Ft. Benning, GA	784-4487	835-4487	404-545-4487
Intelligence	Ft. Huachuca, AZ	None	879-3609	602-253-3609
Maintenance and Supply	Tobyhanna Army Depot, PA	None	795-7900	717-894-7900
Missiles and Munitions	Redstone Arsenal, AL	None	746-6627	205-876-6627
Ordnance (Help Line)	Aberdeen Proving Gnd, MD	None	283-4357	301-278-4357
Quartermaster	Ft. Lee, VA	927-3767	687-3767	802-734-3767
Signal	Ft. Gordon, GA	240-6703	780-6703	404-791-6703
Soldier Support Center	Ft. Benjamin Harrison, IN	542-4962	699-4962	317-542-4962
Supply	New Cumberland Army Depot, PA	None	997-7431	717-782-7431
Supply	R&D Center, Natick, MA	None	256-5341	617-651-5341
Turbine Engines	Corpus Christi Army Depot, TX	None	861-2651	512-939-2651

DOET Under Enlisted Management at Aviation Center

Mr. Al Endicott
U.S. Army Aviation Center
Fort Rucker, AL

photos by SP4 Jim Southworth

WIRE IT RIGHT. Sergeant Major Jack L. Scott, left, shows students from the Utility Helicopter Repairer Course at Ft. Rucker, AL, how to safetywire a boot to the collective sleeve assembly of the transmission of a UH-1 Huey helicopter. Scott, who has been in Army aircraft maintenance all of his 24-year Army career, is chief of Maintenance Training Division, Department of Enlisted Training (DOET).

THE ARMY AVIATION Center's Department of Enlisted Training (DOET) at Ft. Rucker, AL, went to "zero strength" in officer ranks recently. The department's management and leadership are now in the hands of the Aviation Branch noncommissioned officer (NCO) corps.

The concept of NCO leadership is not new. Sergeants have long been the backbone of basic and combat skills training. The Aviation Logistics School at Ft. Eustis, VA, has had senior NCOs heading various divisions of military occupational specialty (MOS) enlisted training for a number of years.

Sergeant Major William R. Dunn was selected to be the first enlisted department director in the Army. Sergeant Major Jack L. Scott was selected as chief of Maintenance Training Division (MTD), and Master Sergeant Charles L. Jones became chief of the Air Traffic Control (ATC) Divison.

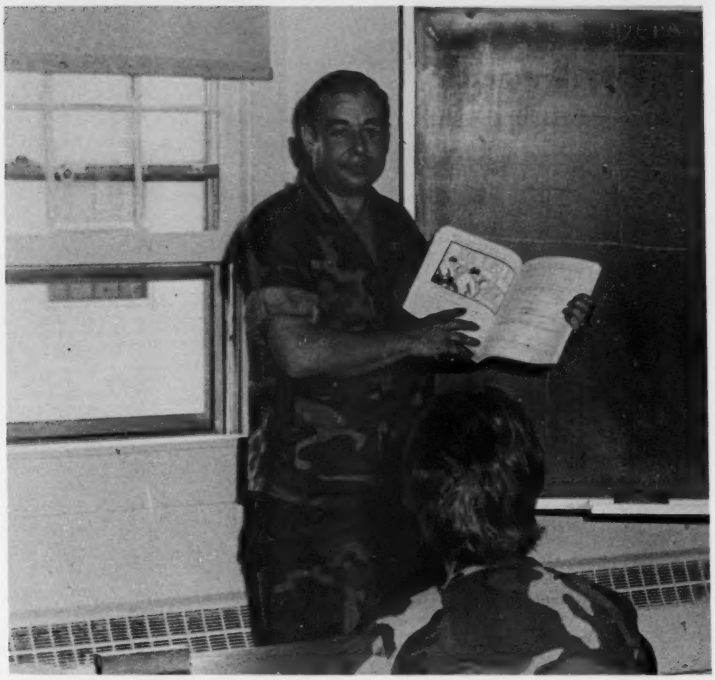
Dunn, a 29-year Army veteran, said of the conversion, "Having enlisted leadership for enlisted training will, I expect, give the Army a better quality soldier."

He added the establishment of NCO leadership will allow the department "hierarchy" to implement some decisions which, when seen and known by junior NCOs, should increase their initiative.

"I think the change is great because the conversion will give the NCO input to the commanding general from the director level. It also allows enlisted personnel to be on that director level concerning enlisted training procedures," he said.

Of his 29 years in the Army, Sergeant Major Dunn has served 27 in Aviation, in jobs ranging from helicopter mechanic to command sergeant major. He also has had two assignments as a company first sergeant and knows the needs of the students because he has served as an instructor in Aviation maintenance, both at Ft. Rucker and Ft. Eustis. Sergeant Major Dunn also helped smooth out the rough edges when the Aviation Branch was established, as the sergeant major of the Aviation Proponency Office.

To lead effectively, training managers must have knowledgeable



LEARNING BY THE BOOK. Master Sergeant Charles L. Jones gives first-day instruction to students in the Air Traffic Control School at Ft. Rucker, AL. Jones, a 17-year Army veteran, is the first enlisted chief of Air Traffic Control Division.

and dedicated assistants. The new DOET director is no different. He has two thoroughly qualified division chiefs in Scott and Jones.

Scott has been in the Army for 24 years, all served in aircraft maintenance, from the L-19 (0-1) fixed wing to helicopters. After serving as chief instructor of the division, Scott went to the Sergeants Major Academy and, in February 1982, returned to Ft. Rucker as sergeant major of MTD.

Proponency for utility and observation helicopter maintenance instruction (the people responsible for establishing and maintaining courses of instruction) is in the hands of the Army Aviation Logistics School at Ft. Eustis. But Scott said, "...we have good communication with them in solving problems we encounter in our training syllabus."

The new maintenance chief controls training for soldiers who repair utility and observation helicopters. During the past fiscal year, the division graduated more than 1,800 soldiers to be helicopter mechanics in the field.

Since becoming division chiefs, Scott and Jones agreed that "...our dealings with activities on the post have been good, receptive responses. The directorates have been very courteous in our communications, just as Ft. Eustis has been."

Jones has been in the Army for 17 years, all in air traffic control. He believes the conversion to enlisted leadership will be very beneficial for all NCOs.

"The conversion will enhance the NCO corps by placing senior NCOs in high visibility leadership and decisionmaking positions, directly increasing the prestige of the NCO corps in Army Aviation," he said.

"Assigning NCOs in these positions also will enable them to exercise their potential as leaders," he added.

Jones joined Ft. Rucker's Directorate of Evaluation and Standardization in 1981 as project NCO of ATC internal evaluations. In February 1982, he became a senior instructor in the ATC School, followed by duties as section leader, branch noncommissioned officer-in-charge and division sergeant major.

Jones, like Scott, reports good cooperation between his division and other units. His division is different from MTD in that proponency for the ATC School is held within the Aviation Branch. That enables a close working relationship between his division, DOET, and the Directorate of Training and Doctrine to "iron out" any changes in the courses of instruction for any of the three ATC MOSs. Jones' division conducts ground controlled approach, tower operator and flight operations training.

During the fiscal year just completed, Jones said his school graduated more than 700 students.

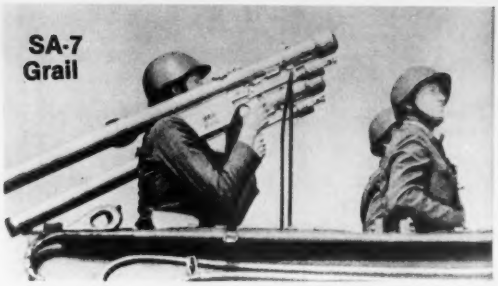
"Our (ATC) student load is on the decrease right now because of the quality soldiers we have recruited in the past couple years," he said. "More qualified men and women are being retained in the Army, so DA (Department of the Army) only sends enough to fill the anticipated needs of field units. This is the first time in my career that the Army has had a need to reduce the (ATC) student load," he added.

Scott and Jones both feel that the quality of NCO leadership will have a direct, positive impact on retention rates in Aviation MOSs. Consistent with an "Army of Excellence," they are optimistic about the future of the soldiers and the NCOs in the Aviation Branch.

THREAT

Major Walter H. Hermsmeier
Threat Branch
Directorate of Combat Developments
U. S. Army Aviation Center
Fort Rucker, AL

The Key Threat to Army Aviation



The SA-7 Grail infrared missiles, the SA-9 Gaskin surface-to-air missiles and the ZSU-23-4 fully integrated, self-propelled antiaircraft systems, pose a real threat to U.S. forces.

THERE IS NO doubt that the highly mobile Soviet air defense umbrella is a formidable threat to low, medium and high flying aircraft extending far beyond the forward line of own troops (FLOT). Their air defense system is quite impressive and most definitely is a threat to Army tactical Aviation. However, a closer look at Soviet air defense system capabilities, as they relate to our present doctrine, will point out some significant deficiencies.

To understand air defense capabilities, we must first understand the target. The helicopter is a relatively sophisticated piece of machinery with the unique characteristic of being able to obtain forward flight at altitude as well as to remain airborne and stationary, just above the ground. This identifies the helicopter not only as an air target, but also as a potential ground target.

The question is, will the helicopter be at altitude near the FLOT? Of course not! So why do we consider them in the same flight arena as the A-10? The helicopter is actually a highly mobile ground target capable of low to medium altitude flight, but employed similarly to a tank or armored personnel carrier with regard to the type of terrain.

Looking at the capabilities of the Soviet air defense we will be able to understand better what is and isn't a threat to Army Aviation.

Let's start with the SA-7 Grail infrared (IR) missiles. The Grail is a man-portable, shoulder-fired, low altitude, surface-to-air missile system similar to the U.S. Army's Redeye. It has a high explosive (HE) warhead and passive IR homing guidance. The effectiveness of the SA-7 depends on its ability to lock onto the heat source of targets, usually low flying fixed and rotary wing aircraft. The SA-7A has a range of 3.6 kilometers (km) and a kill zone of between 45 and 3,000 meters (m) in altitude. The upgraded version, SA-7B, differs from the SA-7A primarily by using a boosted propellant charge to increase range and speed.

The greatest weakness is that the gunner must acquire the target visually. Because of the Soviet doctrine of rapid movement and high speed offensive, it will be very difficult for the gunner to acquire the helicopter if properly masked in the nap-of-the-earth environment. Fur-

ther, IR jammers, IR paint and hot metal plume suppressors will add survivability for the helicopter by reducing the IR signature.

The SA-9 Gaskin is a short range, low altitude, surface-to-air missile. It has a passive IR seeker and an HE warhead. The SA-9 has a range of about 8 km and an operator seated in the vehicle cabin is alerted to an approaching target by a surveillance data link. The operator then tracks the target optically through a large window at the base of the launcher pedestal. The SA-9 must depend on radar links for information on targets until they are visually acquired. The system is susceptible to suppressive fires and battlefield obscuration. The SA-9s are teamed with a platoon of four ZSU-23-4s to cover the "dead" space of the SA-6 system in the division air defense umbrella.

The ZSU-23-4 is a fully integrated, self-propelled antiaircraft system with four liquid cooled 23 mm automatic cannons mounted on the front of a large, flat armored turret. The ZSU-23-4 has the capability to both acquire and track low flying aircraft targets, with an effective antiaircraft range of 2,500 m. It also is capable of firing on the move because of its integrated radar/gun stabilization system. The high frequency operation of the gun dish radar emits a very narrow beam that provides for excellent aircraft tracking while itself being difficult to detect or evade. Electronic target acquisition, tracking and ranging are automated, and an onboard computer determines super elevation and azimuth lead. Conventional optical sights also are available. Despite its good record, the ZSU-23-4 is expected to be replaced in the mid-1980s by a 30 to 40 mm gun with an improved antiaircraft range, rate of fire and fire control equipment.

The Soviets have long recognized the threat the U. S. attack and scout helicopters present to their armor and mechanized forces, and have stated that all weapons would be employed to counter them; this includes antitank guided missiles (ATGMs).

Although not optimized as antihelicopter weapons, ATGMs have many advantages in this role. Unlike radar directed systems, no indication is given to the pilots that they are being tracked or fired upon. Except for obscurants, evasive manuevers are the only

countermeasure available. Finally, ATGMs are very accurate at extended ranges and the sheer numbers make them a formidable helicopter threat.

Although still in its infancy, laser technology has excited the imagination of both scientists and the public at large because the possible applications of lasers are wide and diverse.

Lasers are being used in increasing roles throughout the civilian community as well as the military establishment. A few examples of civilian use of lasers are: construction, surgery, engraving and alignment of instruments. In the military, laser technology is being continually applied in the development of many new systems (not just weapons). Range finding, missile guidance, target designation and communication systems are just a few examples.

A laser beam is produced by excitation of an "active medium" lasing material to an upper unstable energy level. In returning to the lower, more stable energy level, the material will lase or give off energy in the form of light of constant phase and wave length. With a focusing mechanism directing this light energy in a specified direction, a laser beam is produced.

A successful laser engagement occurs when a specific target has been engaged, and the desired destructive or degrading results are obtained. It's important to remember that the laser alone does not offer the necessary capabilities to replace the conventional systems of today. But, the laser looms as a tremendous supplement to conventional systems.

Looking into the future, the Soviets are improving and replacing their existing systems as we now know them. We can expect to see the SA-11 replace the SA-6, the SA-14 replace the SA-7, and the ZSU-X replace the ZSU-23-4—all with improved capabilities. Further, we must understand that many of the radars on the battlefield are able to acquire, track and handoff targets as they deem necessary. Therefore, execution of good tactics, cover and concealment to maintain our effectiveness on the modern battlefield is imperative.

ZSU-23-4

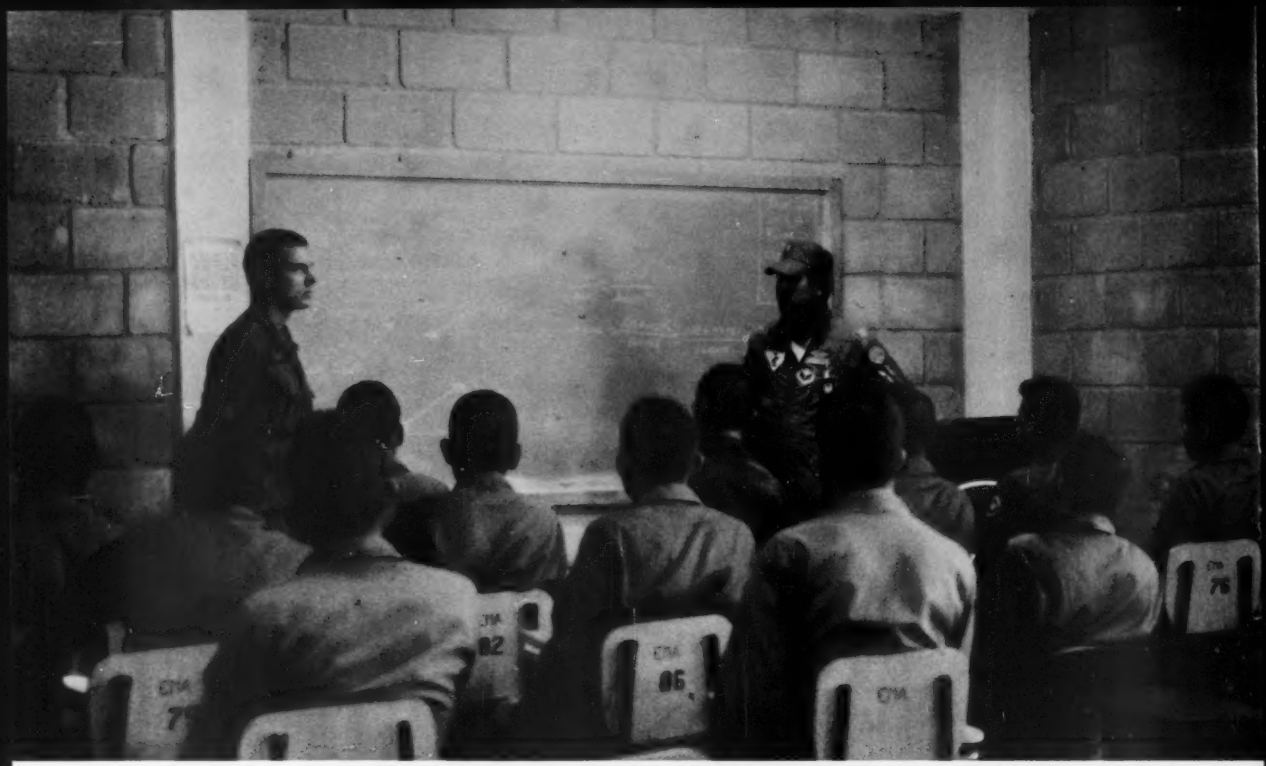
Goal — $2,500,000
MARCH 1985 — $1,500,000 cash and pledges

Army Aviation MUSEUM

This is a series about the Army Aviation Museum Foundation fund drive. Currently, plans call for building a modern complex to house your Army Aviation Museum. Since last month additional donations have been received. However, we still have a ways to go, as the barometer above shows. If you would like to help "build" the Army Aviation Museum's new home, you are invited to send a tax deductible contribution to: The Army Aviation Museum Foundation, Box H, Ft. Rucker, AL 36362-5000, If you desire additional information call Mr. Ed Brown at (205) 598-2508.

A Look at What's In Your Museum

The Mi-4 Hound, produced in 1952, is a Russian troop and cargo transport helicopter. This single rotor, quadcycle gear, 18-cylinder radial engine aircraft is used extensively by the Soviet armed forces. As a cargo helicopter the Mi-4 is equipped with rear clamshell doors and ramps for loading small vehicles. Of particular interest are the following: the rotor system incorporating deicer strips in the leading edges of the blade; a pressurized spar that can be used as a spar/blade failure indicator; and, blade-tracking lights located at the tips of the blades. A suppressive-fire gunner's station can be installed on a prone-position pad underneath the helicopter with entrance through the floor of the cabin, and it also can be converted to an air ambulance carrier for medical evacuations. The Mi-4 on display was transferred to the museum in 1970 from the Military Air Service in Washington, DC.



Honduran Heights

The Training of a Central American Aviator

Captain Leonard J. Samborowski
224th Military Intelligence Battalion

Selection is meticulous and training is rigid for cadets chosen to attend the 2-year flight training course; therefore, from an average 1,500 applications received, only 90 are accepted for attendance at the Honduran Air Force Academy located at Palmerola Airfield.

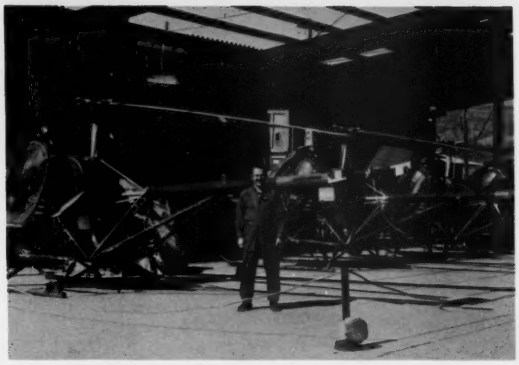
FOUR THIRTY AM: It is the beginning of a hot morning that will melt into a day scorched by the sun and soaked in humidity. The flight candidates hit the polished barracks' tiles as the strained voices of their senior cadets prod them to move faster.

No, this isn't the Aviation Center at Ft. Rucker, AL. These flight candidates are Central American cadets at the Honduran Air Force Academy, some 1,300 miles from Ft. Rucker. Their training is tough and challenging and, like their North American counterparts, they will be pushed to the limit in their quest to earn flight wings.

The Honduran Air Force Academy is located at the Palmerola Airfield, about 5 miles south of Comayagua, Honduras, in the Valle De Comayagua. Palmerola provides a rich view of the 7,000-foot Cerro Pacheco mountains which accent the local area and make instrument flying a challenge for the cadets.

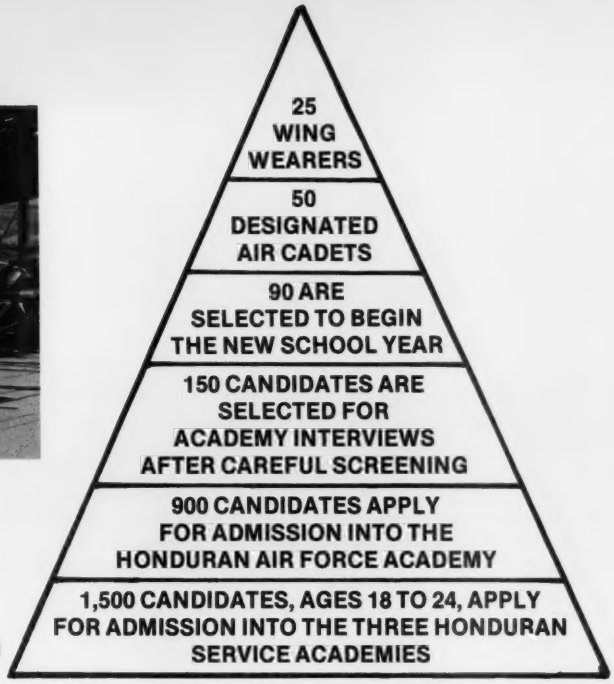
In 1980 there was little in this area except some small farms. Now, there stands an impressive complex which includes two administration buildings, a flight operations center, two maintenance hangars, barracks to accommodate more than 150 cadets and two academic buildings, complete with English language labs.

Additionally, there is an 8,000-foot runway under construction which will provide plenty of room for practice autorotations.



ABOVE: CW3 Guillermo Calvo Jr., and the TH-55 fleet.

LEFT: Math class with the author's guide, Lieutenant Miguel Murillo, the assistant operations officer.



The "RIGHT STUFF" Pyramid

Cadet Selection

The Academy runs a meticulous cadet selection program. Only the best of the Honduran youth pass through the school's fine filter. Each year hundreds of high school or trade school graduates, ages 18 to 24, respond to advertisements in the newspapers and on the radios to enter the armed forces.

Differing from the United States, the armed forces of Honduras include the Army (divided into Infantry, Artillery, Armor and Engineers), the Air Force, the Navy and the Public Security Force.

On an average, about 1,500 people respond to the call for the service academies. From these 1,500 aspirants only 90 are picked to attend the Air Force Academy. From the 90 called, only 50 are chosen to wear the air cadet designation; the remainder are slotted for logistics or maintenance training.

The selected 90 begin their basic training phase on the first day of their arrival at Palmerola. This phase lasts 6 weeks during which they earn every centavo of the 50 lempira, or $25, they earn each month.

As in the United States, all common soldierly skills are taught to the cadets. Marching (Chilean style), military history, M-14 marksmanship, patrolling techniques and leadership skills are stressed. Saluting, although a crucial element in the military courtesy of a young officer, is not taught. Saluting is only allowed after the cadets have successfully completed the 30- to 45-day basic phase; for only then has the future fledgling earned the right to salute.

Throughout basic and their entire stay at the Academy the cadets go through physical training. Each morning from 0500 to 0535 they perform physical training. Most mornings find the cadets going through their versions of the daily dozen and a fast 2 mile run. For variation, they participate in soccer, softball or basketball—activities that emphasize physical coordination.

As at the Aviation Center, physical training is used to motivate those exceptional cadets who lack the necessary intensity. The senior cadets are in charge of this motivational challenge and without question they know how to handle their hesitant charges.

Academics

Most Academy cadets are highly motivated. They must be to make it through their next phase of training—academics. This 9-month phase further separates the aviators from those students destined to spend their military careers merely reading about flying.

Taking 8 hours of class a day, the cadets learn a myriad of subjects: math, aerodynamics, geometry, navigation, meteorology, trigonometry and hydraulic systems. For the purpose of developing a well-rounded

Daily Schedule

0430	WAKE UP
0500-0530	PHYSICAL TRAINING
0600-0615	REVEILLE *
0615-0700	BREAKFAST
0700-0745	CLEAN BARRACKS
0800-1150	ACADEMICS
1200-1300	LUNCH
1300-1700	ACADEMICS
1700-1745	SUPPER
1800-1830	RETREAT *
1900-2100	STUDY HALL
2130	LIGHTS OUT

* Only Senior Cadets are granted the privilege of serving on the Academy's Color Guard.

officer, subjects such as history, social science and geopolitics are taught. Additionally, a well staffed language lab teaches the cadets the international air traffic control language, English.

Through the academic instruction the standards are strict. Test results are recorded and a class ranking is maintained. Being first academically brings the reward of class leadership. Conversely, test failures mark a step toward removal. In each section of academics the curriculum block is divided into 7 classes. A failure on three tests during one block buys that student a ticket home. There is not a recycle.

If these standards appear harsh, they are so for a reason. The proud country of Honduras must stretch its cadets to their limits to gain the best officers possible. The number of available candidates and amount of money is limited in this country of 3 million people. Consequently, the cadets' 2-year training must be intensive and efficient.

Helicopter Training

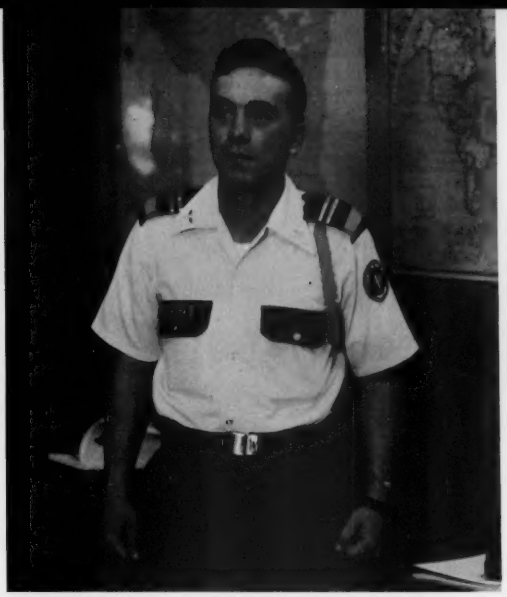
After a year at the Air Force Academy, flight training begins. The Academy's goal is to train each air cadet to be a versatile, multiaircraft, full combat and transport pilot. This translates into helicopter training for most cadets.

Helicopter training began at Palmerola in February 1983, when academic instruction was given in aerodynamics and maintenance. Previously helicopter training had been conducted at the nation's capital, Tegucigalpa, by Honduran instructor pilots (IPs) who had gone through a 3-month instructor course at Ft. Rucker. However, the Honduran Air Force decided that a better solution was in order. It requested and received the support of two Spanish speaking instructors from the U. S. Army Aviation Center. These warrant officer instructors were given two missions by the Honduran/U. S. agreement. Their first assignment was to prepare for the self-sufficiency of the Academy's helicopter program by training instructor pilots and establishing the foundation for a maintenance program. Their second task was to fill the Air Force helicopter pilot shortage by training new pilots.

Rising to meet these challenges were CW3 Guillermo Calvo and CW3 Alvero Guzman. Bleak surroundings awaited these U. S. Army warrant officers when they stepped off the C-130 at Palmerola Airfield. They were greeted by two Honduran instructors and two TH-55s. Only one TH-55 was flyable. With these limited resources they were expected to qualify 25 cadets, 4 IPs and establish a maintenance program—all in 15 months.

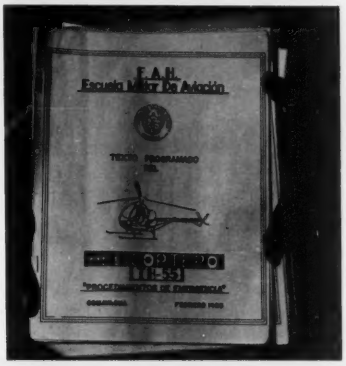
The first priority went to securing additional aircraft and training mechanics. Although CW3 Guzman was a former maintenance officer with a library of Hughes technical manuals at his disposal, there was difficulty in translating the books into practical application. In stepped the Lone Star State, Texas. The Honduran Air Force, through its purchasing agent in Houston, secured the services of Marshal Mitchell, on leave from the Houston Police Department. Mitchell, a maintenance expert on the TH-55, helped bring the struggling TH-55 fleet up to speed. Through Mitchell's tutorial help, four more mechanics were trained.

With the embryonic aircraft maintenance program established, flight training began in earnest. In May 1983, 37 air cadets began their transition in the TH-55. Given the word that the Air Force was looking for 25



LEFT: Senior Cadet Zepeda in the English Language Lab.

BELOW: Translated Emergency Procedures Manual.



pilots, with the guidance to graduate quality, Guzman, Calvo and the two Honduran IPs went to work. Using 8 airframes, they flew 1,400 hours between May and October. For their training outlines they used the same flight guides that are in effect at Ft. Rucker. All manuals and study guides were translated verbatim by CW3 Guzman and incorporated into the flight instruction.

Operating with an average student load of six cadets, the first helicopter class trained with hardcore enthusiasm. Fifty flight hours of training were allocated for each student. This broke out into 38 hours of dual training and 12 hours of solo time. When the rotor wash was settled in late October, 17 cadets were qualified from the original group. Although short of the Air Force goal of 25, their quality was high. After a year at the Academy 20 cadets were reclassified into the maintenance or logistics fields and were no longer aviator candidates.

The work that CW3 Calvo and CW3 Guzman accomplished during their stay in Honduras lay the foundation for the present helicopter training program at the Academy. In May 1984, the first pure Honduran flight class began with 6 Honduran IPs, 8 airframes and a goal of 25 qualified aviators. By October this Academy training goal was met. Thanks to the groundwork of two U.S. Army warrant officers, the Honduran Air Force now can realize its dream of self sufficiency.

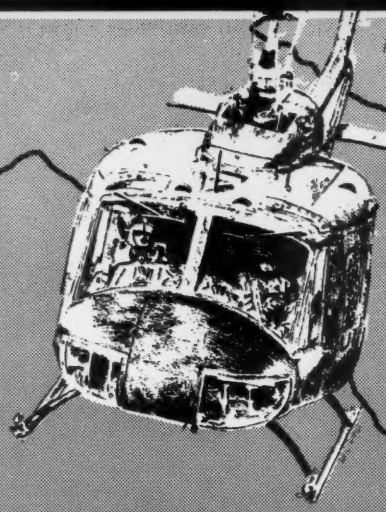
Future

The Honduran government has ambitious plans for its Air Force Academy. A new hexagon Academy complex is slated for completion by the fall of 1990, about one-half mile away from the current buildings. This structure, complete with a gymnasium and auditorium, will enable the Academy to train 50 pilots a year rather than the present rate of 25. Most importantly, the Academy can grow with future national needs.

With more than 80 percent of Honduras classified as mountainous, the importance of the helicopter to the defense of Honduras is fully recognized by the nation's leaders. With the memory of the brief but serious war with El Salvador in July 1969, and the threat of Nicaragua to its east, the nation of Honduras must maintain strong, responsive air power to ensure its political integrity. The TH-55 training received at Palmerola Airfield and the follow-on UH-1 training at Tegucigalpa are vital links in the development of the defensive armor of Honduran air power.

The beginnings of the future — the new Academy building.

Captain Chris Acker
Company A
25th Combat Aviation Brigade
Schofield Barracks, HI



ROTORS OVER SOUTHEAST ASIA

For the first time in almost 10 years UH-1 Hueys were flown in Southeast Asia to participate in a joint Thailand and U.S. military operation to train aviators to land aircraft aboard Navy ships. Labeled as a good learning experience, **Cobra Gold 84** was a success.

HULA DANCER, this is Army 21665, feet wet, I have a visual, request entry into Delta pattern."

"Army 21665 this is Hula Dancer control, Roger. Report 5 miles astern for entry into Delta pattern."

It is 28 June 1984. The location is 10 miles north of the Island of Maui, in the Hawaiian Islands. Two UH-1 Huey aircraft assigned to Company A, 25th Combat Aviation Battalion, Schofield Barracks, HI, have departed the airport at Maui for a rendezvous with the *USS New Orleans.* Five hundred feet above the blue water of the Pacific, they enter the Delta pattern and prepare to land on the rolling deck of the *New Orleans.*

The mission is to train seven aviators from Company A in landing deck procedures aboard Navy ships. The aviators each must make five approaches and landings before they are qualified to operate Army aircraft aboard Navy ships. These seven Army aviators would soon deploy with an Infantry battalion from the 25th Infantry Division to Thailand. They would participate in a joint U. S. Military—Thailand exercise in the southern part of Thailand, flying the first Army Hueys in Southeast Asia for

almost a decade, in Operation Cobra Gold 84.

On 17 July 1984, two UH-1 helicopters were loaded aboard an Air Force C-141 aircraft at Hickam AFB, HI. Their journey took them to Guam and Clark Air Base in the Philippines before they reached their final destination at Haat Yai, Thailand. On 18 July, at about 1630 hours, the two Hueys were unloaded from the C-141 by the deploying pilots and crewchiefs. Thus the Huey, the work horse of Army Aviation for so many years, was back in Southeast Asia.

The two aircraft were towed across the airfield to a Royal Thai Air Force hangar where reassembly began the following day. Then we received bad news: All UH-1 aircraft were grounded pending replacement of the pitch change link clevises. But, thanks to the concern of the battalion and company commanders back in Hawaii, the needed parts were immediately dispatched to us. They were installed and both aircraft were finally ready for their initial test flights.

On 30 July, at about 1330 hours, our test pilot pulled up on the collective of aircraft 21665 for an initial hover check and thus logged the first Army helicopter flight in Thailand in almost 10 years. We subsequently test flew both aircraft and deployed to our base camp 60 nautical miles east of Haat Yai.

Our area of operation would have caused anyone who flew in Vietnam to have a flashback. Rich, green rice paddies, verdant jungle hills and rubber plantations characterized the area. In the south was a small mountain range and the Malaysian border. To the north and east lay the deep, blue waters of the Gulf of Thailand, and to the west was the Indian Ocean and Burma.

Our base camp was a Thai Army training compound. Upon arrival at the camp, we received an airspace and threat briefing from Thai Army officials and we were informed that small pockets of Communist sympathizers were spotted throughout the area. These groups did not cause us any trouble during the exercise. The Royal Thai Army provided more than adequate protection for our people and aircraft.

During the next 2 weeks we flew numerous missions in support of the 1/14th Infantry and the Thai Army. Our most important mission turned out to be aerial resupply of drinking water to troops operating in the field. Fresh water was in demand as the daily temperature rose above 90 degrees and the humidity stood at better than 90 percent. Other missions included emergency medevac, convoy control and area reconnaissance.

The crewmembers who deployed were given an excellent opportunity to navigate, using 1:50,000 scale maps, over unfamiliar jungle, mountain and coastal area. They experienced firsthand what it is like to fly in the cockpit when the temperature approaches 100 degrees. They flew at maximum gross weight for the existing environmental conditions. Overall it was an excellent learning experience.

The Thai people were the most gentle, cordial and hospitable hosts imaginable. They took every opportunity to talk to us, assisted us in any way they could and made us feel that we were indeed welcome.

On 10 August, we departed our base camp and flew back to Haat Yai. There we prepared our aircraft for reloading aboard C-141 aircraft for our redeployment to Hawaii. The following day the UH-1s were loaded and we departed Thailand.

Cobra Gold 84 was history. We had worked long and arduous hours with the Thai Army and made many new friends. Also, we were subjected to flying UH-1s in all types of environments and conditions. It was a valuable learning experience for all who participated. We learned firsthand the problems associated with a 5,000-mile supply line, overcame a language barrier and accomplished our mission.

I truly feel that in the south of Thailand today, Army Aviation is looked upon with respect and pride by the Thai Army and the Thai people. When the mission comes down for Cobra Gold 85 there will be no problem finding pilot and crewchief volunteers in the 25th Combat Aviation Battalion.

Air assault exercise from UH-1 Huey.

AH-64 UPDATE

Captain David W. Starr
Resident Training Division
Directorate of Plans and Training
U. S. Army Aviation Center
Fort Rucker, AL

THE DECEMBER 1983 issue of *Aviation Digest* outlined the AH-64 Apache Aviator Training Program. Many changes in the training program have occurred since that article was written. However the AH-64 Aviator Qualification Course (AQC) and Instructor Pilot Course program of instruction (POI) remain the same. AQC remains 14 weeks with 24 flight hours in the AH-1S Pilot Night Vision Sensor surrogate aircraft, 41 flight hours in the AH-64 and 15 flight hours in the Combat Mission Simulator (CMS), for a total of 80 flight hours. Instructor pilots (IPs) remain an additional 2 weeks receiving 12 flight hours. Copies of the 1983 article can be obtained by writing to Editor, *Aviation Digest*, P. O. Drawer P, Ft. Rucker, AL 36362-5000.

In March 1984 the Aviation Center's ultimate goal of fielding the AH-64 began with an Instructor and Key Personnel Training (IKPT) class. IKPT consists of three classes with the last class scheduled to graduate in June 1985. Twenty-eight instructor pilots will be trained in IKPT, of which 21 will go to Ft. Rucker to teach resident training, 3 to Ft. Eustis, VA, as IPs and maintenance test pilots, 2 to Ft. Hood, TX, 1 of whom is battalion commander of the first unit equipped, and 2 maintenance test pilots for Sikorsky Support Services, Incorporated, maintenance contractor at Ft. Rucker.

Resident training is scheduled to begin June 1985. The class size will be limited to 8 students per class and then increased to 14 when the CMS is available at Ft. Rucker for training. The current projected delivery date for the CMS is January 1986. This delay causes the combat skills portion of the POI to be conducted at a location other than Ft. Rucker. U. S. Army Training and Doctrine Command plans to train combat skills at the Singer-Link facility in Binghamton, NY, using the prototype CMS. The CMS is currently being programed to conduct the tactical scenarios required for combat skills qualification. If the prototype CMS is not available in September 1985 when the first class requires combat skills, then training will be done in the AH-64 aircraft at Yuma, AZ. No matter where combat skills are

conducted, the aviators sent to the U.S. Army Forces Command will be fully qualified in the AH-64.

The first unit equipped, located at Ft. Hood, will be completely filled in March 1986 with 18 AH-64 aircraft and 46 qualified aviators. A battalion will be fielded on an average of every 2 months between March 1986 and the end of 1990, for a total fill of 34 battalions. Each battalion will receive its unit training at Ft. Hood. The 90-day training cycle will concentrate on crew, team, company and battalion operations and will culminate with a battalion ARTEP (Army Training and Evaluation Program). After the completion of training, the battalion will deploy to its designated location as a fully qualified AH-64 attack helicopter battalion.

The prerequisites for qualification in the AH-64 for Active Army and Reserve Component commissioned or warrant officers, and Department of the Army Civilians or Contract (civilian) aviators, are:

- Qualified in the AH-1S with specialty code 15 or 71 or military occupational specialty 100E.
- Current in rotary wing aircraft or attend the Aviation Center's Rotary Wing Aviator Refresher Course prior to attending the AH-64 Aviator Qualification Course.
- Have a minimum of 2 years as a rated aviator with 1 tour of duty in an air cavalry or attack helicopter unit.
- Be on orders to a unit equipped with AH-64.
- Possess a current Army flight physical.
- Current rotary wing instrument rating which will not expire during the course.
- Be nap-of-the-earth qualified.
- Be in possession of a DA Form 2, DA Form 759 and Standard Form 88.
- Have a secret clearance.

The J-series table of organization and equipment calls for one first lieutenant platoon leader in an attack company. To meet this requirement, lieutenants ranked at the top of their class during the instrument phase of Initial Entry Rotary Wing Qualification will be considered for selection to attend the AH-64 Combat Aviator Qualification Course. To meet the AH-1S prerequisites, the lieutenant must successfully complete the AH-1S Qualification Course prior to attending the AH-64 Qualification Course.

Ft. Rucker has not been standing still in the preparation for the arrival of the AH-64 and the start of resident training. There has already been $1.4 million allocated for the construction of a flight simulator building to house the CMS; the scheduled completion date is July 1985. Another $2.6 million has been designated for the addition of two new classrooms, storage improvements at Hanchey Army Airfield and base/stagefield additions. The dedicated and professional efforts put forth since the beginning of the AH-64 program have culminated in a program of instruction that is staffed with the best trained instructors possible, allowing the Aviation Center to produce, upon graduation, a fully qualified AH-64 aviator.

As harsh as this may sound, "kill or be killed" will be a reality if we enter a confrontation against sophisticated threat armor and antiaircraft weapons systems. To better prepare us for that first real-world combat mission, the Army is fielding the world's most sophisticated Aviation training device—bar none—the first Combat Mission Simulator: the AH-64CMS. More than a flight and weapons trainer, it is a combat simulator—used by Apache crews to learn and maintain the tactical decisionmaking skills required to fight and survive in a high threat environment.

This is the first of a five part series of articles that will be appearing in the *Aviation Digest* to introduce the AH-64CMS. Subsequent parts will present the simulation of the Apache helicopter, simulation of the threat, the unique instructional features and future CMS enhancements.

To the Army's future AH-64 pilots and gunners who must learn to kill . . . or be killed by today's highly sophisticated armor and antiaircraft threat systems, this is "Combat Mission Simulator—The Battleground!"

Part I: The Battleground

THE AH-64 APACHE Combat Mission Simulator (CMS) terrain data base design is complete. Early evaluations by military and industry experts indicate that terrain design has far exceeded everyone's expectations. The battleground, built through a modular area block design approach, has advanced the state-of-the-art of computer generated imagery terrain simulation, both technically and tactically. For some time it will be a model for industry of the terrain design requirements necessary to support helicopter combat skills training and nap-of-the-earth (NOE) flight in a high threat environment.

The Modeling Concept

The CMS battleground or geographical data base is 32 kilometers (km) by 40 km square (see accompanying figure) consisting of 300 square km of rear airfield area and nearly 900 square km of tactical area of operations. The geographical data base is modeled in 1 km square pieces called area blocks which are categorized by the type of terrain they contain. Terrain is further categorized by either its intrinsic or extrinsic characteristic to support "threat survivable" NOE flight in a high threat environment.

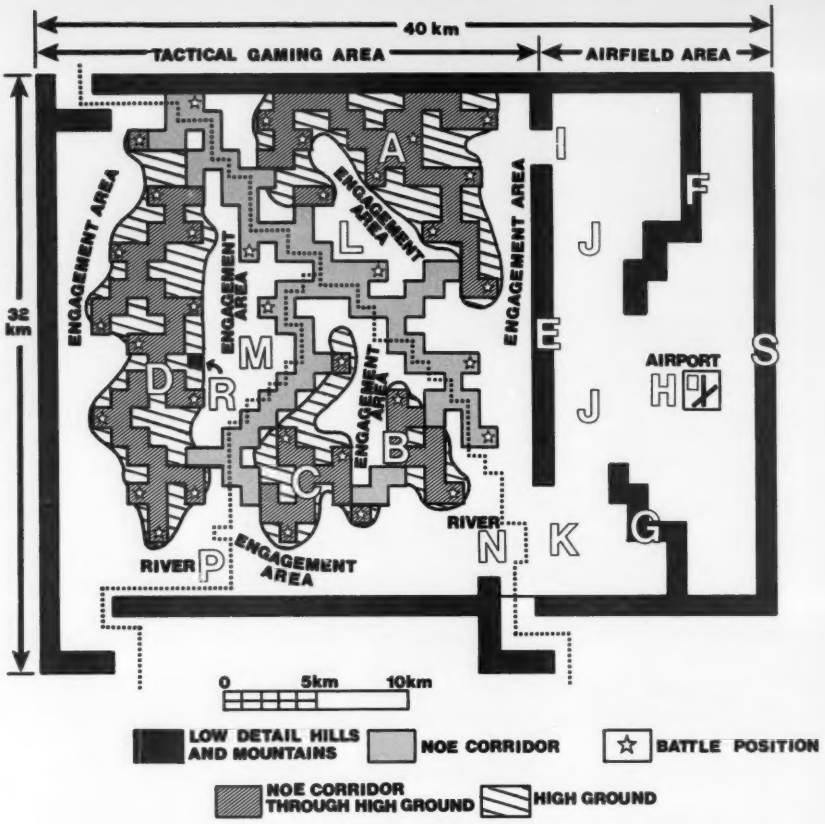
Historically, industry has modeled terrain scenes by distributing the available computer edges* equally across the whole of the data base, the average edge density method, a practice which cannot provide the scene complexity necessary to support the minimum NOE requirements.

To get a better handle on the problem, the contractor modeled one NOE area block with close Army scrutiny in an attempt to satisfy the NOE scene density requirement. The experiment revealed that it took three times the average edge density allocated to terrain design under the antiquated average edge density method. With the contractor proclaiming that the computer couldn't generate three times its capacity and the Army unable to accept less than an NOE capability, the modular 1 km square area block modeling concept was born. Under the concept, 20 percent of the area

*Two points making a line that is used as a unit of measure to describe the density or complexity of a scene.

Illustration by Robert D. Sloan courtesy of Singer-Link

CW4 William Yarlett
Office of the Project Manager for Training Devices
Naval Training Center
Orlando, FL



blocks are designed to support NOE flight (3 times the average edge density) while 80 percent support the remaining training requirements (half the average edge density). Since the ratio of non-NOE to NOE area blocks is 4 to 1, a realistic NOE terrain model is possible at or less than the edge capacity of the computer. Close attention was paid to designing central European terrain with high ground, valleys, hills, rivers and streams to form key geographic characteristics which support combat skills training while remaining within the edge budget of the computer. Key characteristics of the AH-64CMS battleground are: "predictable threat avenues of movement, predictable NOE flight routes and battle positions along threat-survivable terrain by virtue of the fact that flight anywhere else would provide little if any mask, and an unsatisfactory probability of survival in a richly populated threat area of operation."

The Design

Like colors to an artist, area blocks provide the terrain data base designer the flexibility to create the area of operation. An unlimited variety of terrain designs are possible using relatively few types of area blocks. The area block types that are used in the CMS are:

- Battle position NOE area blocks.
- High ground NOE maneuver area blocks.
- Low ground NOE river area blocks.
- Low ground NOE maneuver area blocks.
- NOE maneuver area connector blocks.
- Non-NOE supportive engagement area blocks.
- Non-NOE supportive navigation/waypoint area blocks.
- Non-NOE supportive low detail mountainous surrounding blocks.

Blocks may be rotated, repositioned or repeated to form an in-

finite variety of generic valleys, ridgelines, hills, rivers or mountains.

NOE corridors or routes are formed by linking NOE maneuver area blocks together. Careful attention was given to route width and subtle blending of NOE terrain to adjoining non-NOE terrain. NOE routes support navigation training requirements in so much as continuous decision-making is necessary to determine the correct way to proceed. NOE area blocks support aircraft masking when the ownship (simulator) is flown between 0 and 10 feet above ground level. The aircraft can be maneuvered NOE across the visual data base to one of 34 battle positions that permit effective engagment and destruction of the threat anywhere in the battleground.

The Airfield Area

The 12 by 27 km airfield area east of Offenkamm Ridge (E, in the figure) has a state-of-the-art airfield model at its hub. Airfield area terrain will support traffic patterns at the airport and low altitude flights to and from the tactical threat gaming area. Tactical beacons are strategically placed throughout the airfield area to enable tactical instrument flight into the threat gaming area at the lowest possible en route altitude. The prominent features in the airfield area are roads, telephone poles and high electrical transmission towers, trees, buildings, an airfield and a nuclear power plant. There are 15 foot terrain elevation changes over the level, low grounds (J, in the figure), 200 foot high ridge lines (F and G, in the figure) within the airfield area and 1,000 foot high mountains surrounding it (S, in the figure). There are two passes in the mountains between the airfield area and the tactical gaming area. The airfield has two runways, a helipad, a large ramp area, taxiways, operations building, control tower, firehouse, two hangars and a maintenance building.

Under visual flight rules (VFR) conditions, aircraft departing Wittlich Airfield (H, in the figure) within the 3d Army rear will travel northwest or southwest to enter the 2d Brigade, 92d Armored Division tactical area of operations west of the Offenkamm Ridge. The northwest route takes the crew through the Norden Pass (I, in the figure) and into the 1st Battalion area of operations. The southwest route bypasses the Offenkamm Ridge via the Nieder Pass (K, in the figure) and leads into the 2d Battalion area. The Offenkamm Ridge which rises 300 to 1,000 feet above the Gemeinschussel Valley (J, in the figure) provides adequate mask from tactical gaming area threats during terrain flight to and from the airfield. Valley floor terrain is gently sloping, and is sparsley covered with foliage (trees, bushes, etc.). Because the airfield area is not intended to support fighting it is void of threat vehicles. The area is intended to support takeoffs and landings at the airfield and en route flight to and from the tactical gaming area from 50 feet contour on up.

The Offenkamm Ridge also masks the ownship from the threat when en route under tactical instrument meteorological conditions (IMC) at the lowest minimum en route altitude (MEA) needed to clear terrain within the regulated safety zones. Two ridgelines protruding into the airfield area from the north and south demand MEA changes in tactical instrument flight planning. Two nondirectional beacons and a ground controlled approach are available for instrument approaches into Wittlich Airfield. Tactical beacons are scattered within the airfield area to accommodate diversity in route selections under IMC conditions. Tactical beacon separation and width of the north and south openings in the Offenkamm Ridge enable entry into the threat gaming area while maintaining the absolute minimum en route altitude possible. Under the worst tactical risk conditions the threat can be expected to acquire ownship the moment it comes through the Norden Pass. Under such circumstances, crews may descend to NOE altitude within the clear zone (safety area) beyond the Hauskamm Ridge (F, in the figure) but before the Norden Pass. Once breaking out of the weather, they can sprint low level or contour to the tactical gaming NOE areas. One hundred twenty-five foot tall electrical transmission towers extend across the Nieder Pass providing a considerable hazard to aviators choosing to return to base special VFR or to scramble out to the attack low level along the southern route.

The Tactical Area of Operations

Entry to the tactical threat gaming area is an ominous experience. The two passes in the Offenkamm Ridge are 20 km apart. Suspected and known enemy positions will require the pilot to properly choose the best route to take. Two large masses of high ground terrain, Guterhochebene (A, in the figure) and Hammhochebene (B, in the figure) will provide some mask to ownship sprinting through the pass toward more NOE accommodating, threat-survivable terrain. The 27 by 27 km tactical gaming area has terrain designed to support NOE flight, combat skills training and tactical decisionmaking. By flying low and slow, ownship can maintain mask flying atop high ground or traversing the threat infested valleys between areas of high ground. State-

AH-64 Combat Mission Simulator.
illustration courtesy of Singer-Link

of-the-art Soviet threat antiaircraft weapon systems, infrared and radar acquisition and guidance systems will kill the crew that ignores terrain mask usage.

Rolling terrain atop Guterhochebene, Hammhochebene, Zentrumhochebene (C, in the figure) and Speyerhochebene (D, in the figure) varies in elevation 200 to 450 feet above the Jagsttal (L, in the figure) and Altmuhltal (M, in the figure) Valleys. Twenty-eight battle positions are modeled atop the Hochebenes and six are modeled in the valley, each one rich in terrain detail and containing many choice firing positions for the crew to select from. The elevation of the battle positions accommodates target acquisition at long range across the valley while the ownship hugs the terrain mask and makes use of backdrop. The battle positions are 1 km square providing the crew plenty of maneuver space to relocate between shots from one firing position to another within the battle position.

Navigation in a high threat environment is important. Key terrain hill masses are modeled into the visual gaming area atop which microwave towers, fire towers, water towers and other key cultural features or "waypoints" are located that can be acquired from long range with the target acquisition designation sight. These waypoints can be precision lased to provide the fire control computer the back-axis of ownship position and display to the crew any inaccuracies in the Doppler.

The Jagst River (N, in the figure) and Altmuhl Stream (P, in the figure) cross the terrain from three corners of the data base. The river supports NOE flight across the valley from one high ground mass to another. The terrain along the river for the most part supports masking from threat weapon systems. Periodically the terrain and river banks will get too low to mask the ownship. The navigator must plan accordingly to circumnavigate these interruptions in the river terrain mask, avoid following the river blindly, and avoid the likely acquisition of ownship by threat systems in the area. Because the Doppler has a tendency to go into a memory mode over rivers, close attention must be given to the tactical map until the Doppler position can be updated.

A road network is modeled into the terrain data base which provides the crew additional navigation cues. Key road intersections and bridges at river crossings make ideal waypoints. Telephone poles along roads will have to be plotted by the navigator on the hazards map. Todendorf (R, in the figure) German village, rests peacefully atop the edge of the plateau overlooking the valley.

Within the gaming area are forward arming and refueling sites complete with refueling points, hoses, fuel pumps, ammo pallets, rocket boxes, missile containers and tactical lighting.

For the first time, a high fidelity 1:50,000 scale topographical map will be used for navigation in a simulator. The CMS terrain map will be as accurate as any map currently used by crews operating in real-world European terrain. The map sheet, titled "Tedendorf," represents a fictitious area of Central Germany.

This concludes Part 1—a look at the CMS battleground. The terrain design will support airfield and tactical operations and allow for NOE, contour and low level flight under day, night and inclement weather conditions. The design enables the crew to acquire, engage and kill the threat anywhere in the battleground. It supports combat skills training, encourages crews to use the terrain to fight and reinforces increasing the probability of survival through employment of terrain flight techniques against an aggressive, sophisticated threat armored force.

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